RAILROAD GAZETTE

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Reports to the Master Mechanics' Association.

The American Railway Master Mechanics' Association met in its 32d annual convention at Old Point Comfort, Va., June 19. Abstracts of the reports presented by the various committees follow:

A Research Laboratory Under the Control of the Association.

The most significant results which thus far have been presented to this Association are those which have been derived from carefully conducted experiments and study, a process which, for the purpose of this report, will hereafter be referred to as *ersearch*. These, while they have benefited all roads alike, have been obtained as the result of personal sacrifice on the part of comparatively few members, and at the expense of a few roads.

The establishment of a research laboratory by this Association would be proof of its readiness to adapt itself to the demands of more exacting conditions, and would show in a fitting manner its sense of fairness in requiring contributions from all who receive benefit. A further argument in favor of an aggressive policy in line with the suggestions of this report is to be found in the practice of many of the larger manufacturing establishments in setting aside a certain percentage of their net earnings to be spent each year in betterments. It is this progressive spirit that has given our manufacturers their enormous productive power, increased the quality of their output and reduced its cost. It is not intended to imply that the management of American railroads ignores this principle; such an implication would not be true so far as it applies to many of the larger questions which are involved, but it is true in its application to many roads with reference to the details of some departments.

A Measure of the Problem.—At the present time there are in the United States, in round numbers, 36,000 locomotives, 33,000 passenger equipment cars, and 1,230,000 freight cars. These are probably worth nearly $900,000,000. In keeping this rolling stock in repair, there is spent in the neighborhood of $60,000,000 per annum, not including lubrication and such maintenance. It is thus seen that the value of the equipment and the annual charges for repairing it call for a great outlay of money, and yet there are thousands of points and questions in regard to the design of railroad cars and locomotives which should be cleared up, and upon which valuable (having a cash value) information could be obtained by the proper investigation, conducted in a thorough and reliable manner. One-tenth of one per cent. of the amount paid out yearly for keeping up the condition of the equipment would provide a handsome sum for the purpose of conducting such investigations as have been outlined above.

The Plan.—The committee makes no plea for the details of any plan of organization, but to give definiteness to its argument presents, in the form of an appendix, an outline prepared by one of its members, of the more important features of a plan which appears to be fundamental and safe.

Reference to the appendix will show that a large initial investment is not thought necessary, the use of existing laboratories being proposed rather than the immediate establishment of a new plant. Such a plan appears to your committee not only wise, but it is one to which the Association, by its past practice, is already committed. By selecting one laboratory for one line of investigation and another for a second line, the co-operation of men and materials best suited to the needs of the Association would be secured.

The Cost.—The cost of organizing and maintaining such a movement, even on the limited scale proposed, would be considerable. Within limits, the results are likely to prove beneficial in proportion to the money which is put into the work. Great returns are not ordinarily expected from small investments. To insure a degree of success which will comport with the dignity of the society, the proposed organization should be assured of existence for at least three years, and money for maintenance during this period should be in sight. The *minimum* amount which your committee deems necessary for a period of three years is $40,000, of which $12,000 should be available during the first year, and $14,000 during each of the two succeeding years. If more could be provided, the returns would be still greater. During the period of assured existence the research laboratory may be relied upon to justify its existence to an extent which will thereafter be the means of supplying whatever may be necessary for its proper conduct. If it were to fail in this it would be time to stop expenditure.

Routine Work.—It is likely that the existence of an organization for research would lead to work of a routine character, such as examination of water, chemical and physical tests of materials, etc., for individual roads, especially for smaller lines which do not now maintain laboratories nor have engineers of tests. If undertaken at all, the cost of such work should be paid for by parties receiving benefit, and could, therefore, be self-supporting. Routine work, however, should not be undertaken at all along lines in which private laboratories are prepared to give satisfactory service at reasonable cost, for such work is distinctly less significant than that of research. The one may serve to keep practice up to known standards, but the other is the basis which serves to advance practice. A research laboratory, therefore, should not be drawn away from its high calling by the allurements of minor interests.

In conclusion, that the matter herein presented may receive proper consideration, your committee would recommend the passage of the following resolution, to wit:

Resolved, That in the opinion of this Association there is need of more concerted action in the development of such practical and scientific facts as are needed to direct practice in the design and maintenance of railroad equipment; and,

Resolved, That the Executive Committee be and is hereby directed to carefully consider the plan for a research laboratory under the direction of the Association; and is authorized to formulate a plan of organization; to ascertain by what methods the necessary money can be assured; and, so far as may be practicable and expedient, to proceed with the actual work of organization; also,

Resolved, That in case the Master Mechanics' Association should become merged into, or consolidated with, the Car Builders' Association before action is taken under these resolutions, the persons who at the close of the present convention represent this body in an executive capacity, be and hereby are authorized and directed by this body to present the whole question covered by these resolutions to such Directors or Executive Committee as may hereafter represent the interests which are now intrusted to the care of this Association or of the two associations named; and be it further

Resolved, That it is the desire of this body to have presented a report of progress at the next annual convention of this Association, or at the next convention of such association as may one year from date represent the interests of this Association.

This report is signed by G. R. Henderson, W. F. M. Goss and John Player.

Appendix.

A Possible Plan for Organization.

A research laboratory does not necessarily involve extensive equipment, nor large initial investments. It would, in fact, be wholly impracticable to equip at once a laboratory which for several years to come would be suited to the needs of this Association. The first requisite to the establishment of a research laboratory is an organization of men. Everything hinges upon them. Such an organization could, by using existing laboratories, accomplish results which in their importance would be greatly out of proportion to their cost. There are in round numbers fifty institutions of learning in this country having laboratory facilities for experimental work more or less extensive. Any of these institutions will gladly permit any authorized representative of such an organization as the Master Mechanics' Association to use its apparatus for the general good, and in many cases they will be found ready to contribute the time of assistants. The one thing which the Association would need to supply is direction. By securing the co-operation of such laboratories as may be suited to its need, and by supplying directive force, the Association can in many cases have results for the cost of supervision.

A research laboratory under the control of the Association should involve conditions which, briefly, are as follows:

All matters growing out of or affecting the research work should rest with the Executive Committee of the Association.

There should be appointed by the Executive Committee a Director of Research, with whom would rest the appointment of such assistants as from time to time might be necessary. The Director should be responsible to the Executive Committee.

The organization for research would not affect the present methods of assigning subjects to committees, but the Director of Research would serve the committees when called upon to do so.

The Executive Committee would be responsible to the Association for the expense entailed by investigations instituted by the working committee, and for this reason no work should be inaugurated until an outline, together with an estimate of its cost, should have received the approval of the Executive Committee.

While it is probable that the process herein suggested will, if vigorously followed, develop a permanent organization, it would seem wise, at least in the beginning, to call in special assistance to serve in the solution of special problems. It is possible also that apparatus would gradually accumulate, but in the beginning the laboratory would not need to be more extensive than the office of the Director, which would become headquarters for the laboratory.

To provide an element of permanency, a laboratory should, if once started, be assured of existence for a period of several years, otherwise everything would need to proceed on a temporary basis, which is never profitable in scientific research.

Signed by W. F. M. Goss.

A Research Laboratory.

The subjects referred to such an institution would be of the same nature as are now daily and constantly taken up by the railroad laboratories already established by individual roads.

Upon this assumption a research laboratory will have to be equipped not only for routine, but also for unusual work of any and all descriptions, usually referred to specialists, consulting engineers, physicists or chemists.

It must be unfettered and untrammeled by individuality or idiosyncrasies—that is, it must be so free from entanglements of any kind that no matter from whom or where orders are received, the work placed under its jurisdiction will receive active, earnest and unbiased treatment, and the truth only sought for, no matter what the case or circumstances may be. In other words, it is the middle ground between the road and its officers, the manufacturer and the road, the employee and the employer. The results obtained from investigations must be given as they are found. A laboratory founded on such broad principles and with unlimited scope for research will be of incalculable value to the Association and the roads its members represent. . . .

As experience has shown in our railroad laboratories, a machine shop equipped with tools for making instruments or special devices would be an absolute necessity. This shop would contain machinery for working metals and wood. For fuel tests a battery of boilers and a large engine would be necessary. For physical tests this laboratory would have to be equipped with a number of compression and tension machines with capacities varying from at least 500,000 pounds to 10,000 pounds for heavy and light testing, torsional machines, oil-testing machines (similar to Franklin Oil Company's), brake-shoe tester, wheel and axle drops, wire-testing and cloth-testing machines, brake racks, air and hydraulic compression plants, locomotive-testing plant capable of receiving the smallest to the largest locomotive, stay-bolt testers, and such other special testing machines as are found in our railroad laboratories, machines for testing cements and mortars, dynamometer cars, tachometers, barometers, thermometers, a full set of electrical testing apparatus, standard gages and templates, standards of form and size adopted by the Association.

The chemical section must be thoroughly equipped with up-to-date aparatus for all kinds of chemical investigations of all natures and descriptions.

A complete electrical outfit of engines, dynamos, storage batteries and instruments must be provided.

The laboratory would also have to be equipped with standards of length, weight and measures.

Accessory equipment would include pyrometers, calorimeters, microscopes, indicators, and such other instruments as are likely to be needed.

Signed by John Player.

Cost of a Laboratory.

While the report as a whole recommends the utilization of existing laboratories, which will reduce to a minimum the cost of the organization, it may be advisable to submit some figures showing the probable cost of a laboratory fitted for ordinary routine work, and a certain amount of the simpler processes in research. It would, of course, be impossible to give any idea of the cost of a laboratory for research alone, as certain lines would require apparatus which might be more or less expensive, according to the needs of the work under consideration. The writer has made an approximate estimate of a small laboratory comprising a brick building approximately 75 by 120 feet, 20 feet of the length of which could be two stories, the upper floor to be used as a chemical laboratory, and the lower floor as offices, drawing-room, storeroom, etc., the remaining space to be about 18 feet high and to contain the machinery for testing and experimenting. A small annex would contain the boiler and fuel.

The apparatus needed to commence work in a limited way (and which would have to receive important additions from time to time as occasion demanded) might be about as follows:

One locomotive testing plant, like that of the C. & N. W. Ry., but arranged to suit a locomotive with five pairs of drivers, with tanks, scales, tracks, etc.
One 300,000-pound testing machine.
One 100,000-pound testing machine.
One journal and lubricating testing machine.
One torsional testing machine.
One 12-inch lathe.
One 30-inch lathe.
One milling machine.
One drill press.
One planer.
One slotter.
One small forge and fan.
One 50 horse-power steam engine.
One 75 horse-power boiler.
One air-pump or compressor.
Shafting, belting, etc.
Gages, meters and various apparatus for recording and measuring.
One complete outfit for chemical laboratory.

It is believed that this lot of machinery and building could be obtained and erected for approximately $50,000, and that the cost of operating and conducting it in a creditable manner would run from $20,000 to $25,000 per year. Of course, routine work could be charged for on a regular basis, but it is quite probable that this would interfere seriously with research work, which should be the main object of the organization. Besides, the

outfit above described would be far from being complete, and would need additions from the start. We think that it will thus be clear that there are many points to be made in favor of the arrangement proposed in the body of the report, and that the maximum results could be obtained by a minimum cost under the proposed scheme, without requiring the immediate outlay for building and equipment. The director would, of course, have to keep informed as to the best locality for conducting the various tests that were desired, and make arrangements for the prompt conduct of the same, but we think that the various colleges would, with their usual liberality, generously assist in the enterprise.

Signed by G. R. Henderson.

Best Methods of Preventing Trouble in Boilers from Water Impurities.

This is an extensive and able discussion of the subject of boiler water purification, but our space at this time will only permit of a presentation of the committee's recommendations, which form a good summary of the paper.

The first effort in preventing trouble in boilers from water impurities should be in searching out sources of supply furnishing the best obtainable feed waters.

1. In building a water station where, by a larger first outlay, water of a better quality (that is, costing less for purification) may be obtained the question should be carefully considered before accepting the poorer water in order to save first cost of the plant. The treatment of water is inexpensive, and the cost will pay the interest on a large investment. For example, in a station furnishing 100,000 gals. of water in twenty-four hours, which costs 4½ cents per 1,000 gals. for purification, were it possible to substitute a supply costing but 2¼ cents per 1,000 gals. for treatment, an outlay of $16,425 would be warranted in order to bring about the change. The annual cost for purifying the 4½-cent water would be $1,642.50; for the 2¼-cent, $821.25; the difference in the cost for the two treatments being $821.25, which equals 5 per cent. on an investment of $16,425.

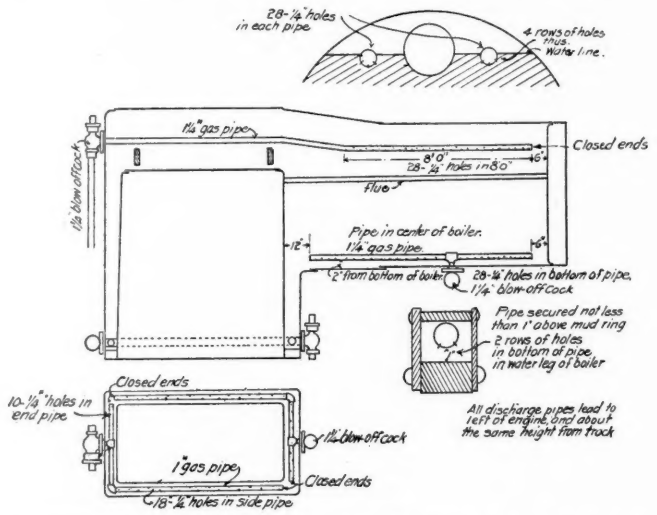
2. Where necessity compels the use of troublesome water there are few cases where by treatment, either mchanically or chemically, fairly good waters for boilers may not be obtained, the important consideration being the method employed. There are in the market numerous so-called water purifiers, purges, oils and boiler-cleaners, many of them absolutely worthless, others dangerous. It should be a rule never to allow the use of any compound for this purpose until its effects and dangers are fully understood.

3. The cost of purifying waters will always be cheap when compared with the use of waters which cause trouble in the boiler. The best methods to be employed can only be determined when the conditions are fully understood. The cost for water purification depends on the character of the water and the methods and reagents employed. Lime and soda ash are the cheapest of the effective and harmless reagents for this purpose, and direct treatment in the tender is the least costly method. Waters carrying twenty-five grains of incrusting matter per gallon, five of which are sulphates, may be successfully treated with soda ash at a cost of about 40 cents per 1,000 miles of engine mileage, or about 6.12 mills per 1,000 gals. of water. With engines equipped with blow-off cocks of sufficient number and correctly located, and with four per cent. of the water taken blown out, in keeping the boiler free from sludge, the engine may be safely and satisfactorily run from 2,000 to 3,000 miles between washouts. Assuming the cost for untreated water to be 10 cents per 1,000 gals., the 4 per cent. wasted in blowing out would represent a value of 4 mills per 1,000 gals., or a total for treatment and waste of 10.12 mills. In this calculation no account is taken of the heat losses in the water blown out, and if the blowing out be done at the end of the trip, when the engine goes into the roundhouse for a layover, it should not be. But if on the road, a further cost equal to the value of the heat in the water wasted should be aded to the other expenses for water purification. In waters of the character and treated by the methods just referred to, the results that may be expected from engines in freight service is that 100,000 to 200,000 miles may be made between changes of flues, and that the life of fireboxes will be from eight to fifteen years.

Water with forty grains of incrusting matter, seven or eight of which are sulphates, may be treated in the same manner with fairly good results, but with an additional cost for reagents and blowing out in proportion to the increase in incrusting matter and sulphate.

Treatment of water in the station tank costs for reagents from 2¼ to 4½ cents per 1,000 gals., and we estimate the loss of water in cleaning the settling tank, and in blowing out to keep the concentration of alkali to a safe limit, to be as great as by the direct method. The first cost for the water station is greater and will be further increased by the introduction of automatic devices for delivering the reagents. On the other hand, the special advantages are that the treatment may be varied to suit each particular condition of water; also that the water freed from sludge will carry a greater concentration of alkali without trouble from foaming.

The cost for treatment of water by mechanical purifiers or cleaners is for the water and heat lost in blowing out. The blow-off cock is the active agent for purification in all mechanical cleaners; the part performed by the remainder of the devices is to assist in bringing mud within its reach. An engine


28-¼" holes in each pipe.
4 rows of holes thus. Water line.
1½" gas pipe
1½" blow off cock
8'0"
28-¼" holes in 8'0"
Closed ends
Flue
Pipe in center of boiler. 1¼" gas pipe.
12"
6"
2" from bottom of boiler
28-¼" holes in bottom of pipe.
1¼" blow-off cock
Pipe secured not less than 1" above mud ring
2 rows of holes in bottom of pipe, in water leg of boiler
7"
All discharge pipes lead to left of engine, and about the same height from truck
Closed ends
10-1⅛" holes in end pipe
1½" blow-off cock
1" gas pipe
Closed ends
18-¼" holes in side pipe

Arrangement of Surface and Blow-Off Cocks on En ines of N. Y., C. & St. L. R. R.

fitted with blow-off cocks, as shown, which is the standard on the New York, Chicago & St. Louis, is, we believe, fully equipped with a good purifier. When waters contain little or no sulphates, or where alkali is troublesome or earthy matter is in suspension, they may be successfully handled by mechanical devices. We do not consider it safe practice, where sulphates are to be dealt with, to depend upon mechanical devices, except they be reinforced by chemical reagents for neutralizing the incrusting matter.

The cost for clarification of water by filtering or settling is for the first cost of the plant, the interest and maintenance. By the unaided method, the only other expense should be for attendance and water used in cleaning. With the mechanical filter, the water used for this purpose should not exceed 5 per cent. of the amount pumped, and the time consumed in cleaning should be about fifteen to twenty minutes every five to ten hours. Where coagulants are used, there will be an additional cost for chemicals of 1 to 2 cents per 1,000 gals. of water clarified.

The cost of water purification by evaporation represents the most effective practice of the day. The price given, 36 cents per 1,000 gals., will be varied in proportion as the costs of labor and fuel be greater or less than the figures used in the case cited, namely, that of a railroad water station of moderate capacity, large enough to supply 24 engines per day of 24 hours, or 100,000 gals. daily capacity. The coal consumption will be 23,400 lbs. per 24 hours, or 975 lbs. per hour. Allowing 3 lbs. of coal per horse power per hour, the necessary boilers will develop 325 horse power. The labor required to operate the plant would be about three men by day and two at night. At $2 each per day, the daily labor would amount to $10. Assuming coal to cost $2.50 per gross ton, the daily coal bill would be $26. Neglecting incidental expenses, maintenance, interest, etc., the daily operating expense is $36, or 36 cents per 1,000 gals.

4. There should be on the staff of the Superintendent of Motive Power, where the size of the system will warrant, and boiler feed waters are troublesome, two specialists; one a boiler washing inspector, who has charge of the boiler washing. In the performance of his duties, he should as often as possible visit the different roundhouses and shops to see that they are equipped with and using the tools intended for this purpose; that the boiler washers understand how, and are doing good boiler washing; where soda ash put in the tender is the reagent and method employed for purification, to see that the correct amount is properly put in, observe the manner in which the blowing-off is done, and to stay at each point until a personal inspection has been made of all boilers cared for by them.

The other specialist should be an assistant to the chemist, and should have a knowledge of the chemistry of water, and a good understanding of geology; the water supply of the system, so far as relates to quality, to be directed by him. Among his duties to be the searching for, and locating, the best sources of water, looking after the condition of water in existing stations, and where any falling off in quality develops, to determine the cause. The analysis records, and reports in relation to water purification and supply, and its performance in the boilers, to be under his charge. He should spend a part of his time on the road personally inspecting pumping and purifying plants and methods, and should keep in close touch with the boiler washing inspector, roundhouses and shops.

A man of this character, with a correct understanding and well directed efforts, would make himself useful in the department, and be the means of materially lessening trouble in boilers from water impurities.

This report is signed by A. E. Manchester, J. H. Manning, S. B. Bush, H. Barlett and R. M. Galbraith.

Cast-Iron and Steel-Tired Wheels for Locomotive and Passenger Car Equipment.

The Norfolk & Western reports that cast-iron wheels are used exclusively except in the case of engine trucks. Here steel-tired wheels are used as a matter of safety. The price of a 600-lb. cast-iron wheel is $4.85 as made by this company. This price does not include cost of superintendence or repairs of buildings.

The Chicago, Burlington & Quincy, through Mr. G. W. Rhodes, says: "It has always been our practice to advocate cast-iron wheels made to M. C. B. specifications and tests when they do not exceed 33 in. in diameter, as being the cheapest wheel to use, and as safe a wheel as any steel-tired wheel." One exception is made to this: For engine trucks steel-tired wheels are used, as they are considered less liable to have broken flanges. For wheels larger than 30 in. diameter, it is thought steel-tired wheels should be used, but have a number of 37-in. cast-iron wheels in service with no indications of breakage. In the last few months this road had two steel-tired wheels broken, one of which derailed a car. Tire was fastened by a Gibson retaining ring. A similar case has occurred with a cast-iron wheel recently.

The Lake Shore & Michigan Southern, through Mr. Stevens, in adition to the information given on the statements, reports as follows: Average number of turnings for steel-tired wheels is two, and cost $1.25; steel-tired wheels are safer than cast-iron wheels; otherwise the relative merits are about the same. The Lake Shore & Michigan Southern, through the General Master Car Builder, report in addition to data given in statements: Cost of turning steel-tired wheels, $1.62 per pair; average number of turnings, 4.

The Chicago, Milwaukee & St. Paul report, in addition to data given in statements, as follows: Cost of turning steel-tired wheels, $1.85 per pair; average number of turnings, 4. Steel-tired wheels are safer than cast-iron wheels for engine trucks, on account of tendency of these wheels to breakage of flanges. For all other service, its experience has been that cast-iron wheels are safer than steel-tired wheels. The actual number of breakages of such a character as would derail a car is greater for steel-tired wheels than for cast-iron, although about ten times as many cast-iron wheels as steel-tired wheels are in service. Steel-tired wheels are more expensive in both passenger car and locomotive service. The cost per 1,000 miles for steel-tired wheels is more than three times as great as for cast-iron wheels.

The committee regrets that more information based on actual records was not furnished, as conclusions on this subject should be based on facts and not on unsubstantiated opinions. It should be remembered that the item of wheel service is the most expensive single item with which we have to contend. The mileage obtained from the best cast-iron wheels is fully three times as great as the poorest. The factor of safety in favor of the best cast-iron wheels as compared with the poorest bears at least an equal proportion. The same relations as to breakage exists as to steel-tired wheels. While the mileage relations of the various steel-tired wheels approaches much nearer to uniformity, it is not believed that this would be the case if the manufacture of steel-tired wheels were exposed to the same unbridled competition as is the case with cast-iron wheels. If there is no difference in the matter of safety, then the cost should decide the question. In the case of wheels, first cost is very far from deciding what is the most economical. Relative durability must always be taken into consideration. This can be done most definitely by keeping an individual record of wheels used and removed, and the actual mileage of the cars under which the wheels made their service. This method is cumbersome and many roads hesitate in going to the expense of maintaining such a record. The same results, however, can be approximated much more simply and with little labor by the following method: Make record, for example, of all tenders running with 33-in. cast-iron wheels; also

of all wheels removed from these tenders during the year; obtain the mileage of these tenders for the same period and multiply by eight to obtain the total wheel mileage; divide this sum by the number of wheels removed, and the result will approximate closely with the actual wheel mileage obtained. While this method omits many details of importance, it gives actual results as a whole, and is much better than no information whatever.

Turning now to the statements presented with this report. Statements Nos. 7 and 8 give the relative breakage of steel-tired and cast-iron wheels. There is considerable discrepancy in these reports; the L. S. & M. S. report shows very much in favor of steel-tired wheels; the C. M. & St. P. report shows in favor of the cast-iron wheels. With the information as presented, your committee is unable to draw any definite conclusion, and would say that further information is required.

As to the comparative cost, as shown on Statement No. 9, there is a decided discrepancy in the cost per 1,000 miles in passenger car service, partly due to difference in average mileage and partly to difference in relative value of new wheels and scrap. For locomotives the two reports agree much more closely, and if the discrepancies due to difference between cost of new and scrap wheels were removed the cost of service both for cast-iron and steel-tired wheels would be very close indeed, showing in both cases much in favor of cast-iron wheels.

In conclusion, the committee would say:

First—It is not able to decide from the facts presented whether steel-tired wheels are safer than cast-iron wheels, except in case of engine trucks.

Second—For engine trucks it would recommend steel-tired wheels from considerations of safety.

Third—Cast-iron wheel service is cheaper than that obtained from steel-tired wheels.

Fourth—It would recommend that at least the method detailed above be used for determining wheel mileage.

Fifth—That a careful record of breakages be inaugurated and maintained..

This report is signed by J. N. Barr, H. S. Hayward and A. M. Waitt.

Statement No. 7.
Chicago, Milwaukee & St. Paul.
Number of Wheels in Passenger Car Service and Number of Cases of Breakage per 1,000 Wheels.
Cast-iron.

Year.	Number of Wheels in Service.	Breakages.		Number of Cases of Breakage per 1,000 Wheels.	
		Wear and Tear.	Derailment.	Wear and Tear.	Derailment.
1894 ..	6,760	4	0	0 59	0
1895 ...	6,810	21	5	3.08	0.73
1896	6,940	8	1	1.17	0.14
1897	7,030	16	1	2.28	0.14
1898 ...	7,140	10	4	1 40	0.56
Steel-Tired.					
1894 ...	9'0	10	2	10.99	2.20
1895 .	820	25	0	30.49	0
1896 ...	700	4	0	5.71	0
1897	620	6	0	9.68	0
1898	570	6	0	10.53	0

Lake Shore & Michigan Southern reports steel-tired wheels broken, none; cast-iron, 3.3 during last year.

Statement No. 8.
Chicago, Milwaukee & St. Paul.
Number of Wheels in Engine Service, and Number of Cases of Breakage per 1,000 Wheels.
Cast-iron.

Year.	Number of Wheels in Service.	Breakages.		Number of Cases of Breakage per 1,000 Wheels.	
		Wear and Tear.	Derailment.	Wear and Tear.	Derailment.
1894	9,436	9	6	0.95	0 64
1895 ...	9,256	10	11	1 08	1 18
1896 ..	9,236	36	17	3 90	1.84
1897	8,756	21	9	2.40	1.03
1898 .	8,072	22	7	2.73	0.87
Steel-tired.					
1894	416	2	0	4 81	0
1895 ..	436	3	0	6.88	0
1896	536	9	0	16 79	0
1897	920	4	0	4.35	0
1898	1,388	3	2	2.16	1.44

Lake Shore & Michigan Southern reports steel-tired wheels broken, none; cast-iron, 3 per 1,000.

Statement No. 9.
Comparative Cost of Service, per 1,009 Miles, of Steel and Cast-Iron Wheels.

Kind of Wheel.	Class of Service.	Cost New.	Value of Scrap.	Net Cost.	All Scrapped Except Sliding.		All Scrapped.	
					Mileage in Thousands.	Cost per 1,000 Miles in Cents.	Mileage in Thousands.	Cost per 1,000 Miles in Cents.
Lake Shore & Michigan Southern.								
33-inch cast-iron	Pass.	$6.85	$2.62	$4.23	.....	....	...	9.40
" "	Loco.	6.75	4.21	2.54	62	..	62	4.10
30-inch "	"	5.75	4.14	1.61	.....	..	73	2.21
28-inch "	"	5.35	3.55	1.80	.....	....	....	2.77
42-inch steel...	Pass.	67.32	5.00	. ..	.....	....	..	11.98
36-inch "	"	50.63	5.00	.	.....	....	...	9.71
33-inch " ..	Loco.	54.00	5.00	49.00	.....	....	328	15.25
Chicago, Milwaukee & St. Paul.								
33-inch cast-iron	Pass.	$5.50	$3.00	$2.50	108	2.31	89	2.81
" "	Loco.	5.50	3.00	2.50	87	2.87	80	3.13
30-inch "	"	5.13	2.80	2.33	J. J. 83	2.81	81	2.89
					E. T...	....	75	3.11
28-inch "	"	4.75	2.59	2.16	E. T..	....	59	3.66
42-inch steel	Pass.	51.00	5.00	46.00	.....	..	471	9.77
38 inch " ...	"	47.00	5.00	42.00	.....	....	422	9.95
33 inch "	"	41.00	5.00	36.00	.....	....	327	11.04

The Ton-Mile Basis for Motive Power Statistics.

The committee endeavored to obtain from the individual membership an expression of opinion as to the relative value of the various methods now employed by the railroads of this country in presenting motive power statistics; and finds that, while very few of the railroads have adopted the ton-mile basis, they are almost unanimous in expressing the belief that the ton-mile is the most desirable unit to use for the purpose, although many are in doubt as to the practicability of presenting statistics that would be entirely fair for comparison under all conditions.

An argument on the advantages of the ton-mile basis was made by Mr. Quereau, of the committee, being the same as a paper presented to the Western Railway Club, and published in the Railroad Gazette of May 27, 1898.

While that argument clearly illustrates the fallacy of computing the work done by locomotives on the locomotive-mile basis for intelligent comparison, and the great advantage gained by use of the ton-mile unit in freight service, there is a strong tendency to question the advisability of the ton-mile basis in passenger work and switch service. There is no difficulty in keeping ton-mileage for passenger trains; in fact, it was introduced on one large railroad system in this country, and abandoned because they did not consider the results of much interest, as the superintendent or master mechanic of a division has no control over the size of his passenger trains, the weight being determined by competitive and traffic conditions. It is known that the speeds at which they run are wasteful, but they are out of control of the division officials and largely of the managing officers.

It is undoubtedly true that it would be difficult to produce a form for presenting locomotive statistics that would show an entirely fair comparison as between one system with another, or one division with another. However, many members have suggested to the committee, that inasmuch as general managers and superintendents of motive power insist upon having some method of making comparisons of one system with another, or one division with another, that would show so far as possible the relative conditions of the road, the committee has introduced into this report a suggestion for such a statement.

Your committee is of the opinion that the present form of locomotive performance sheet, based wholly on the locomotive-mile unit and sent out generally over the country for purposes of general comparison between railroads, is misleading and unsatisfactory; and while it is almost unanimously conceded that the ton-mile unit for freight locomotive statistics is preferable, even this is unsatisfactory, as the expense of a ton hauled one mile over a mountainous road cannot be compared with that of a ton hauled one mile on a level road. Again, a road with few grades, good water and cheap fuel can make a much better showing in operating locomotives than another road with heavy grades, high-priced fuel and bad water.

The theoretical ideal system, perhaps, was that introduced by Mr. F. W. Johnstone, Superintendent Motive Power of the Mexican Central Railway, and in use on that road from 1884 to 1896. His system reduced all work done by locomotives to the unit of 100-gross tons hauled one mile over a straight and level track, the road being reduced to the equivalent of a straight and level track; his formula for this system is as follows:

"Let 100 gross tons hauled one mile over a straight and level track (at so low a rate of speed that the resistance due to speed will be considered zero) be taken as the unit of work performed, and as the resistance per gross ton hauled upon a straight and level track at a very low speed is 6 lbs., the resistance per gross ton on any grade and at a given speed in miles per hour should be divided by six, and the result must be multiplied into the length of the grade to ascertain the equivalent length of level track. If curves are not compensated, ½ lb. per degree of curvature should be added to the resistance due to grade, speed and rolling friction, before dividing by six."

It is evident that for different speeds per hour the total resistance will vary, and the equivalent straight and level track will likewise vary, therefore it is necessary to figure out these distances separately for trains running on different schedules of speed, and for convenience of computation, tables were prepared to show the total resistance per gross ton on various grades (curves compensated) for trains running at various speeds.

While with this system we could compare the performance of light locomotives on a level section of country with that of heavy locomotives in a mountainous section, it has been objected to on account of the clerical expense involved.

The committee, after a study of the various methods of compiling and presenting locomotive statistics, are of the opinion that greater uniformity of practice is necessary, without which no satisfactory results can be obtained, also that the use of both the ton-mile and the locomotive-mile unit are necessary to properly exhibit all locomotive performance, the former for freight service and the latter for passenger, switch and work service. The following provides for a summary of performance and expense for comparison between divisions of a system, or one system with another, as it seems clear that the requirements of the different roads in making up individual performance of locomotives are of more importance locally than they could be as a matter of comparison with other roads. The following explanation of the proposed form is presented:

Column.

1. Miles of Road Operated:
   Main and branch lines, including double track, but neither sidings nor spur tracks.
2. Total Locomotive Mileage:
   The custom varies considerably in this particular; we believe this item should cover the actual mileage between terminals of locomotives in passenger, freight or mixed trains, including mileage of helping and light locomotives in such service, with no allowance for switching. Mileage of locomotives in mixed trains to be divided in proportion of ¾ to freight service; ¼ to passenger service.
   Switch locomotives to be allowed 6 miles for each hour run; work locomotives to be allowed 8 miles for each hour run.
3. Total Ton-Mileage (in thousands for convenience) in Revenue Freight:
   This represents the total net ton-miles of revenue freight.
4. Total Ton Mileage (in thousands for convenience), Covering Gross Weight of Train:
   Covers the net weight of revenue freight plus the weight of train, which would include the weight of the locomotive, tender and caboose.
5. Tons of Coal Consumed (Tons of 2,000 pounds):
   This should include all fuel consumed by locomotives; coal, wood, fuel oil and kindling, all reduced to tons of coal by assuming a certain number of cords of wood equivalent to a ton of coal, and a certain number of gallons of fuel oil equivalent to a ton of coal.
   In Figuring the Performance of Locomotives on the basis of locomotive miles run, the following has been selected as answering the requirements of the majority. All statistics on a ton-mile basis to apply to freight service only; all other service on a locomotive-mile basis:
6. Locomotive-Miles Run Per Ton of Coal:
   This solely for the purpose of comparing with other roads, although we do not consider that the information given is of much value.
7. Locomotive-Miles Run Per Pint of Lubricating Oil:
   This to include all oil, tallow and grease used in lubricating locomotives and tenders; 8 pounds of grease or tallow assumed equal to one gallon of oil.
8. Locomotive-Miles Run Per Pound of Waste:
   This to cover all waste used in packing boxes of locomotive and tender, or delivered to enginemen, for other use on locomotive, and waste used for wiping.
9. Gross Weight of Train in Tons:
   Thisis to indicate the average weight of the freight train hauled.
10. Gross Ton-Miles Per Pound of Coal:
    This, to us, seems the fairest manner of presenting the results of economy in use of fuel.
11. Division.
12. Repairs:
    This should cover the total cost of all items of expense in connection with the maintenance of locomotives, including repairs, rebuilding, renewals and cost of new locomotives to replace those destroyed or worn out; when such expense is incurred in railroad shops this should include the usual per cent. added to cost for shop expense.
13. Enginemen:
    This to cover wages of locomotive engineers and firemen, traveling engineers and firemen, fuel experts and road foremen of locomotive engineers.
14. Fuel:
    The total cost of fuel delivered on locomotives, as outlined in Column 5; this to include the cost of all handling.
15. Lubricating:
    To cover cost of oil, tallow, grease and waste used in lubricating locomotives and tenders.
16. Roundhousemen:
    To cover cost of roundhousemen; those wiping, watching and dispatching locomotives; cleaning roundhouses and ash pits; turning table, firing up locomotives, filling and washing locomotive boilers, filling headlights, lamps and lanterns, drawing sand, etc.
17. Water Supply:
    Total cost of water as delivered to locomotives.
18. Stores:
    Cost of all oil, waste and rags used in lighting and cleaning lamps; headlight wicks and chimneys, lanterns and lamps used on locomotives; cost of repairs to movable furniture—cans, curtains, cushions, coupling bars, links, pins, switch chains and frogs, also tools carried on locomotives—hammers, axes, pokers, shakers, scoops, hatchets, jackscrews, etc., and supplies carried on locomotives—sand, torpedoes, etc.
19. Total Cost of Locomotive Expense:
    Total cost of all the items in Columns 12 to 18 inclusive.
20. Total Cost Per 100 Revenue Ton-Miles:
    The several roads using this as a basis suggest 100, 1,000 and 10,000 miles respectively, as a unit; we believe 100 miles to be the best adapted.

21. Number of Locomotives in Service:
Different methods of computing this item are in use by different roads; we offer the following as being satisfactory: First, determine the average number of locomotives in the shop by dividing the whole number of days all locomotives were in the shop by 30, dropping fractions of less than 15, 15 and over to count as a whole; then deduct this result, together with the number of unserviceable locomotives, from the total number of locomotives assigned.
22. Average Miles Run Per Locomotive:
The number shown in Column 21 being the divisor used.
23. Ton-Miles (work done) Per Locomotive (in thousands for convenience).
24. Average Ascents and Descents of All Grades Per Mile of Road (Feet):
The obejctions offered to the ton-mile unit as a basis are, that the conditions on different roads vary so greatly as to make it unreliable ,and the fact that cost on this basis is greater on mountain than on valley divisions is understood by all.
We find it impossible at present to equate the conditions referred to on any statement of this sort, and it is not claimed that this showing covers all objections.
25. Percentage of Branch Lines to Total Road Mileage:
This is offered as a means of accounting for the difference in amount of work performed by locomotives on different divisions, it being claimed that on divisions made up of many branch lines locomotives are not able to obtain full loads.
For comparison of performance and expense with previous periods we offer the following comparison with the same month of the previous year.
26. Cost Per Locomotive-Mile Each Service:
Cost per locomotive-mile for passenger, switch and work train service, figured on the same basis as the result in Column 19.
27. Work Done by Each Locomotive (Freight):
Same basis as results in Column 23.
28. Work Done Per Pound of Coal (Freight):
29. Cost of Service Per 100 Gross Ton-Miles (Freight):
Same basis as result in Column 19.

It is believed that the requirements of this form will not entail any additional clerical expense, as nearly all railroad companies are at present furnishing necessary data in some form or other.

This report is signed by H. J. Small, C. H. Quereau and W. H. Marshall.

Best Method of Applying Stay Bolts to Locomotive Boilers.

It has been thought best to submit the report showing, first, the process of manufacture of stay bolts, and to that end the subject will be considered under the following headings:

Cutting Stay Bolts from the Bars.

The general practice is to cut stay bolts off to the required length by a concave cutter in a shearing machine. The Pennsylvania Company cuts them off in a turret lathe. The C. C. C. & St. L. uses the device shown in Fig. 1. The advantage in the use of this device is that the bolt is held more firmly, while being sheared, than in the ordinary concave shears, and it cuts the ends off squarely. When the concave cutter is used there is more or less tendency for the stay bolt to raise up while the shear is cuting, and the result is the end is not cut off squarely. There is no patent on this device.

Making Square Heads on Stay Bolts.

The usual method of making square heads is by the use of a bolt header. The Buffalo & Susquehanna makes them with dies under a steam hammer; the Chicago, Burlington & Quincy mills off square at the end; the Chicago & North-Western makes the square with a punch under the shears; the C. C. C. & St. L. does the same with the device shown in Fig. 2. Heads can be put on with this device by one man at the rate of 300 per hour. An ordinary bolt header can do his work at the rate of 300 per hour, requiring, however, one man and a helper to operate it.

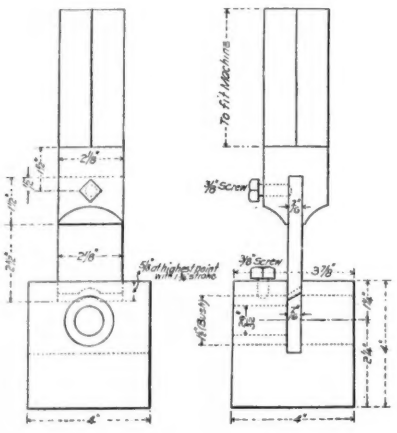


Fig. 1.—Device for Squaring Ends of Iron for Stay Bolts.

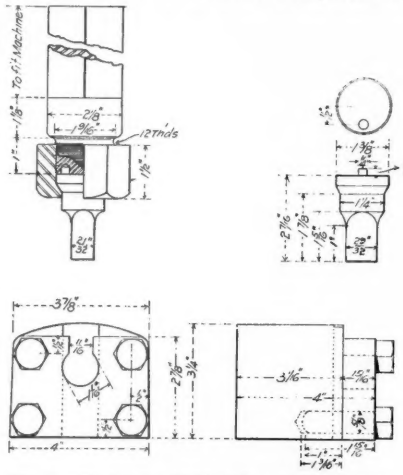


Fig. 2.—Device for Making Square Heads on Stay Bolts.

Headless Bolts.

Several members report that they do not square the ends. The stay bolts are screwed into boiler by the aid of various devices. The Chicago, Burlington & Quincy uses a patent eccentric die, and the Chicago & West Michigan uses a chuck for this purpose. The Northern Pacific reports the use of a device for screwing bolts into firebox. The device used by the Atchison, Topeka & Santa Fe is shown in Fig. 3, which is not patented. The Chicago & Eastern Illinois has tried headless bolts, but has abandoned their use, for the reason that after screwing them in with an air motor an adjustment must be made by the use of an alligator wrench in order to move the bolt just far enough to properly rivet it. The time used in adjusting and removing the alligator wrench more than balances the cost of forging the square ends on bolts.

Cutting Threads.

The Chicago, Milwaukee & St. Paul report the use of a six-spindle cutting machine—running the bolts through twice; the first time roughing them down very nearly to size and the second time with dies that are in perfect condition—only requiring to straighten up, and cutting but little additional thread. The Delaware & Hudson Canal Company also take two cuts on stay bolts—the second cut being a very light one to finish. A better thread can be obtained by this method, though the usual practice is to take but one cut over a stay bolt. A number of roads report the use of a lead screw attachment as essential to produce stay bolts with threads of accurate pitch.

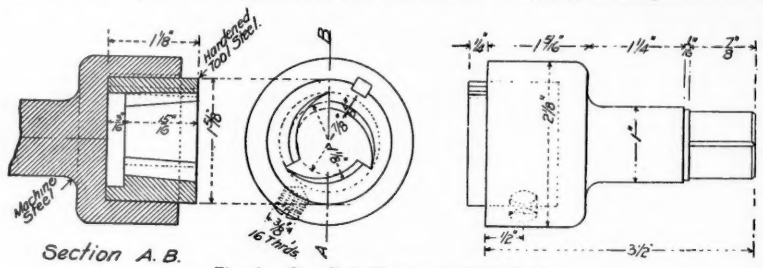


Fig. 3.—Stay Bolt Clutch—A., T. & S. F.

The lubricant reported as giving the best results in cutting stay bolts is lard oil. Summer cottonseed oil is as good, and dies will remain sharp as long with it as with lard oil, but after the bolts are cut it is more liable to gum over the threads. This, however, has not been considered objectionable, except when bolts are prepared and stored for some time before they are used. The Lehigh Vally reports that the best lubricant it has found is two-thirds raw linseed oil and one-third signal oil. The Chicago, Milwaukee & St. Paul uses bolt-cutting oil which consists of 60 per cent. Natural West Virginia oil, 15 per cent. fish oil and 25 per cent. No. 1 lard oil. This is found entirely satisfactory.

Special Forms of Stay Bolts.

The Erie RR. uses upset ends on radial stays; the Chicago, Burlington & Quincy turns stay bolts down in the center with a Niles screw machine; the Boston & Main swages them down in the middle instead of upsetting the ends; the Rio Grande Western cuts them down in the center below the bottom of the threads in a bolt cutter, with blind dies, working with a lead screw; the Chicago Great Western reports the use of crown sheet stay bolts with threads turned off in the middle—the work being done in a turret lathe; the standard practice of the Lehigh Valley is to upset both ends for about 1 in., on which threads are cut, the center of the bolt being left blank; the Northern Pacific reports that all long stay bolts are turned smaller in diameter at the center than at the ends, the work being done on a "Gisholt" machine; the Union Pacific turns stay bolts down in the center in a lathe.

Preparing Stay Bolt Holes.

Numbers of roads prepare stay bolt holes in fireboxes by first punching them smaller than the required size and then reaming them to size—thus removing the disturbed metal; while others drill these holes.

A large number of roads report the use of ordinary stay bolt taps. A number, however, claim advantages in the use of the "Echols" patent stay bolt tap made by Pratt & Whitney. The principle of this tap is the omission of each alternate tooth; each cutting tooth is followed by a space which gives a freedom of action to the cutting teeth, impossible in the old style, thus decreasing the resistance from 30 to 50 per cent.

"Detector" Holes in Solid Stay Bolts.

The general practice is to drill stay bolts after they are in position. A few members report punching these holes by means of a steel-wire punch in a bolt-heading machine. The Chicago & Eastern Illinois uses an air motor attached to a framework allowing the drill to be set at any angle.

In making and applying stay bolts to locomotive boilers, two important factors must be carefully considered: The stay bolt tap and the hob tap which cuts the dies in the bolt-cutting machine must be true to pitch, and then the machine must have some special device for making the threads true to pitch. Cutting stay bolts true to pitch is a subject that deserves more investigation than any other detail connected with making and applying them. The weak point in a great many shops is in cutting stay bolts untrue to pitch. It has been found that accurately pitched dies will not produce true-pitched bolts.

Pratt & Whitney write the committee that "the problem of making a tap with long thread and keeping that thread to approximately correct lead has been a very annoying one to us, and doubtless to others, and is still annoying, for the very reason that we cannot rely upon the extent to which steel will change and the manner in which the change will take place. We overcome this very largely, however, by having carefully annealed steel to begin with; having the annealing as uniform as possible, and threading the tap with a screw which is made expressly for the work, and which has an error approximately the error which takes place in the tap in the hardening operation; i. e., long experience teaches us that steel will change in a certain direction. In the great majority of cases this direction is toward the shortening rather than the lengthening. We accordingly make the lead screw of our lathe long, as stated above, to compensate for the shrinkage or shortening that will take place in the steel when hardening. We very often have to give the tool a double shrinkage in very special cases. What we mean by double shrinkage is hardening the tool and reannealing before the final finish, threading ol all important taps that have any special length of thread. We confine the error to .0015 per inch or .18 in. per foot."

Correctly cut dies alone will not cut true-pitch stay bolts; to insure stay bolts being cut true to pitch, two methods have been employed: A lead screw attached to the carriage of a bolt-cutter is one way to accomplish this, and the other is the lead-controlling feature employed by the Jones & Lamson Machine Company in the dies used in the flat-turret lathe made by them.

The Acme Machinery Company writes the committee as follows:

"All dies that we have any knowledge of gain threads and lose pitch when cutting threads. Some of our expert diemakers can grind a set of dies so that they can be made to do 'most anything,' but that does not help the 'rank and file,' into whose hands such a machine falls. All kinds of schemes and contrivances have been made and used in trying to correct the disposition of a set of dies to cut out of pitch. Supposing, for instance, the rear teeth of a set of dies would act as a nut; they would certainly begin with an error, because the leading teeth are apt to begin with more or less error, as they 'nibble' at the end of a bolt."

At the New York meeting of the American Society of Mechanical Engineers, in December, 1897, Mr. James Hartness, of Jones & Lamson Co., read a paper on a stay bolt threading device which has some valuable features, especially for radial stays, where there are threads on both ends of the stay bolts and long blank spaces between. We quote from the paper: "The scheme may be briefly and perhaps completely described as 'Tandem' dies for simultaneously threading both ends of a stay bolt to insure correspondence in lead. These tandem dies are designed for use in a turret lathe, and cannot be applied to a bolt cutter." Mr. Hartness further states that: "Stay bolts are mostly cut by dies permitted to control their own lead; occasionally, however, a lead screw is used to govern the pitch of the die. The lead-screw scheme seldom controls the lead of the die at the beginning of its cut, on account of the slackness of the slides and intermediate connections; hence the die usually has a chance to cut a very incorrect lead before the screw has taken up the 'slack' and 'spring' of intermediate parts." The dies are described as follows: "The teeth at the front of the die have a cutting clearance, while the teeth at the back of the die have no clearance, but instead, ride on the thread

and control the lead. So accurate is the lead-controlling feature that regular dies for market seldom have an error in lead greater than $\frac{1}{64}$ in. in 18 in., which is less than ¼ in the average error in standard taps."

The investigations of the committee lead it to believe that the best method of making and applying stay bolts is as follows: Cut the stay bolts from the bars by means of a shearing machine; make square ends by the use of a bolt-heading machine, or punching the metal from the bar to form a head; cut threads in a bolt cutter, having a lead screw, or on a turret machine having special dies that will cut true to pitch. For a cutting lubricant, lard oil is the best, with yellow cottonseed oil a close second.

In preparing the stay bolt holes, we recommend that: In the firebox, they should be drilled; in the shell of boiler, punched ⅛ in. smaller than required size and the remainder reamed out with a reamer on the end of the stay bolt tap. Holes should be tapped with some form of air or electric motor, and stay bolts screwed in with the same device.

We also recommend that stay bolt taps, and hob taps for cutting stay bolt dies, be purchased from some reputable maker in preference to making them at a railroad shop. Stay bolt and hob tap making requires special skill and most accurate tools, which are not always available at railroad shops.

For cutting off stay bolts, no device appears to answer for all bolts. The best practice seems to be as follows: Where bolts are of uniform length, and are at right angles with the sheets, as in the vertical water space surrounding the firebox, it is best to "nick" the bolts in a lathe to the right length; after being screwed into place a slight tap on the end is sufficient to break them off. For bolts that require to be cut off at an angle, an electric saw can be used to advantage; as in cutting of radial stay bolts, outside of the boiler. A pneumatic cutting machine can be used to advantage for cutting off bolts of variable lengths after they have been screwed into place, where it would not pay to handle them singly in a lathe or cutting machine.

The committee knows of no better way of riveting stay bolts than the well-known method with the common hammer, and a holding-on hammer at the other end of the stay bolt. It is the committee's opinion that some form of air motor for drilling the "detector" holes in stay bolts is preferable to punching them. The objections to punching detector holes is that while stay bolts are being riveted the holes close up and require to be opened with a drift. When the bolt is drilled after it has been riveted there is no further work to be done.

This report is signed by T. A. Lawes, G. F. Wilson and S. M. Vauclain.

Flanged Tires.

The desirability of using flanged tires on all the driving wheels of mogul, ten-wheel and consolidation engines depends on certain conditions which have to be taken into consideration, and these conditions are as follows:

1. Length of rigid wheel base.
2. Length of total wheel base.
3. The use of rigid or swing-motion engine trucks.
4. Lateral motion between driving box and hub, when engines leave shop.
5. Lateral motion between engine truck box and hub, when engines leave shop.
6. Degree of curvature on line when engines are to be operated.
7. Practice of Roadway Department as to the gage used on curves.

In order to bring out these points, the committee issued a circular to which roads owning 12,265 engines replied, and a summary of the information received is as follows:

	All Flanged.	1 and 3 Flanged.	2 and 3 Flanged.	1 and 4 Flanged.	1, 3 & 4 Flanged.	Total.
Mogul	440	743	.....	.....	.....	1,183
Ten-wheel	534	1,048	702	.....	.....	2,284
Consolidation	348	.....	.....	1,313	405	2,066
Total	1,322	1,791	702	1,313	405	5,533

	Longest Rigid Wheel Base.		Longest Total Wheel Base.	
	All Flanged.	Partly Flanged.	All Flanged.	Partly Flanged.
Mogul	16 ft. 1½ in.	16 ft.	23 ft.	23 ft. 10½ in.
Ten-wheel	14 " 4 "	16 "	24 " 10 in.	26 " 6 "
Consolidation	16 " 3 "	16 " 3 in.	24 " 2 "	24 " 6 "

A swing motion engine truck is used with the three types of engines having all tires flanged, the motion being 1½ in. each side of the center. The same practice prevails with mogul, consolidation and many ten-wheel engines having tires partly flanged, but about 50 per cent. of the ten-wheel engines with tires partly flanged have rigid trucks. No matter whether engines of the types referred to have flanged tires on all driving wheels or not, the prevailing practice when such engines leave the shop is to have the lateral motion in each driving box ⅛ in., and the same with each engine truck box. With tires partly flanged, the distance between backs of flanges for each type of engine covered by this report appears to be 4 ft. 5¼ in.

In the case of engines having flanged tires on all driving wheels, the same practice prevails for mogul and ten-wheel engines. The prevailing practice with consolidation engines having flanged tires on all driving wheels is to have the distance between flanges on first and fourth pair of wheels 4 ft. 5⅛ in., and on the second and third pair of driving wheels 4 ft. 5¼ in.

The sharpest curvature reported from roads using all flanged tires is 18 degrees. The sharpest curvature reported from roads that use engines with driving wheels partly flanged is 16 degrees.

On a majority of roads that have replied to the circular, the track is laid wide of gage on curves, but there does not appear to be any exact ratio between the degree of curvature and the amount that the gage is widened.

The roads using flanged tires on all driving wheels, also the roads using flanged tires on a part of the driving wheels, report that their practice has not caused any trouble, and the benefits resulting from each practice are claimed to be as follows:

1. With flanged tires on all driving wheels:

Less flange wear, as the pressure between the flange and the rail is distributed more.

More uniform wear of flanges and driving wheel hubs.

As the tires wear down, the flange gives them greater strength, and there is less liability of thin tires slipping on center.

It is necessary to carry but one kind of tire and brake shoe in stock.

Engines ride better on curves and there are fewer derailments.

2. With flanged tires on a part of the driving whels, it is claimed that there is less flange wear, engines curve easier, less liability of climbing the rail, less wear of rail heads. Less trouble with sharp flanges.

It will be seen from the above that the advantages claimed from each point of view are about the same, with the exception that the roads using flanged tires on all driving wheels have the advantage as to the variety of tire and brake shoes to be carried in stock, and as to the strength of the tire when reduced in thickness by wear.

In order to obtain information as to the resistance offered by a locomotive when passing through a sharp curve, the committee decided upon making some tests* with a consolidation locomotive, assuming that that type of engine would represent the worst conditions. The tests were made on the tracks of the Lehigh Valley Railroad near Coxton, Penn., and showed that the power required to pull the engine through the curve with the different arangement of tires was practically the same. The committee is not prepared at this time to make any recommendation as to the desirability of using flanged tires on all driving wheels of mogul, ten-wheel and consolidation engines, but suggests the advisability of the investigation being continued, so that a final report can be made next year. If this is thought advisable, the committee would recommend the use of a self-registering dynamometer, and that tests be made on straight track, as well as on a curve, an attachment to be used so as to indicate the lateral motion of the engine on straight track, at maximum speed, with the different tire arrangements.

This report is signed by S. Higgins, W. Garstang and W. H. Thomas.

Nickel Steel in Locomotive Construction.

It is only fair to state that this report was not undertaken until late in April and that no more was proposed than to lay the foundation for the work of a future committee on "Nickel Steel."

Up to this time, nickel steel has only been used in locomotive construction in an experimental way, judging from the answers received to the circular to members. Out of thirty replies, some twenty-five confessed to no experience at all with this metal, and most of the others stated that their experience had been too limited to enable them to give any information on the subject.

Nickel steel is stated to be not a difficult alloy to manufacture, requiring no special furnaces, tools or thermal conditions. The cost of the nickel itself was, until 1875, $6 to $7 a pound, so high as to make its use for such a purpose impossible, but the opening in Canada of the most extensive nickel mines yet discovered has reduced the price to from 30 to 40 cents a pound. Although nickel has been alloyed with steel in almost every proportion, what may now be called commercial nickel steel contains from 2 to 5 per cent. of nickel. Such a material possesses great uniformity, the nickel being uniformly distributed throughout the ingot and not subject to segregation like other ingredients of steel.

The addition of the nickel to steel adds particularly the qualities of toughness, durability and resistance to corrosion. Commercial nickel steel may possess the same elongation as ordinary steel with a tensile strength 30 per cent. higher and an elastic limit at least 75 per cent. higher (Wiggin, Jour. I. & S. Institute). This greater strength, and particularly the higher elastic limit, would appear to make its use for structural material, boilers and machinery, far more advantageous than ordinary steel, especially where a saving in weight is desired and the parts are subjected to alternating stresses. With increased steam pressures, boiler plates two inches and more in thickness are demanded, bringing with them serious difficulties in handling and construction which it may be possible to obviate by using nickel steel plates 25 or 30 per cent. thinner.

Most of the nickel steel made in this country contains about 3 per cent. of nickel, and it is stated that such material can be worked without difficulty; rolled, forged, pressed in dies without cracking, flanged, punched, welded and machined. There seems to be no doubt, however, but that nickel steel cannot be machined as easily as low carbon steel. It takes the edge off tools very rapidly and the finishing cut is apt to sliver. The best of machinery and tools are required to cut a clean thread on stay bolts. One authority says that an alloy containing 1 per cent. of nickel can be easily welded, but that with more nickel the difficulty of this operation increases. With more than 5 per cent. of nickel all of these operations become considerably more difficult. A French authority states that it requires ten times more time to corrode a 5 per cent. nickel steel when dipped in dilute muriatic acid than an ordinary soft steel containing 0.18 carbon. Other experiments, made by leaving planed plates exposed to the action of sea water for a year, showed a loss by corrosion of nickel steel plates of 1.36 per cent.; of mild steel 1.72 per cent.; wrought iron 1.89 per cent. A nickel steel has been offered for locomotive tanks on account of its non-corrosive qualities.

A prominent American manufacturer gives the following specifications as proper for nickel steel parts of locomotives:

Specifications.

Three per cent. Nickel Steel.	Minimum tensile Strength.	Maximum Tensile Strength.	Minimum Elongation.	Elastic Limit.	
Crank pins	78,000	84,000	25% in 2 in.	½ of Ultimate	Oil-tempered.
Piston rods	78,000	84,000	25% in 2 in.	" "	
Driving axles	74,000	80,000	30% in 2 in.	" "	
Side rods	60,000	68,000	25% in 2 in.	" "	
Firebox plates	60,000	68,000	20% in 8 in.	" "	
Staybolts	58,000	66,000	20% in 8 in.	" "	

Maximum P. 0.03, S. 0.03, Mn. 0.40, C. 0.25, Si. 0.03.

From some experiments made in Belgium in 1894, comparing ferro-nickel steel containing carbon 0.06 and nickel 7.5 and a high carbon steel containing carbon 0.55, the following general deductions as to the comparative results of hardening and tempering may be made. In the natural state the carbon steel was considerably superior to the ferro-nickel in point of limit of elacticity and ultimate resistance, but showed a much less elongation and contraction. When hardened in water at 900° or in oil, the ferro-nickel showed itself to be the superior at every point, still retaining a silky fracture, while the fracture of the hardened carbon steel was dry and granular. When annealed at 500° after hardening, the difference was not so marked, the carbon steel showing a greater ultimate resistance, but an inferiority in other respects. These tests show an ultimate resistance of the ferro-nickel of from 76,788 pounds per square inch in its natural state (elastic ratio 75 per cent.) to 177,750 pounds when hardened in water (e. r. 85 per cent.) and 141,631 pounds when hardened in oil (e. r. 97 per cent.). The carbon steel showing 122,292 pounds (60 per cent.), 104,943 pounds (72 per cent.) and 132,815 pounds (76 per cent.), respectively.

The results of quite exhaustive tests of nickel steel made by the St. Jacques Steel Works in France are of sufficient practical interest to be quoted here in full. These permit the classification of the metal into three different groups:

"1. Steels containing 2 to 5 per cent. of nickel. Their resistance increases with the percentage of nickel, especially when the carbon content is low. When carbon reaches 0.50 per cent. or more the presence of nickel has little influence. Steel of this class forges and rolls well. When hardened the ratio of elastic limit to ultimate resistance becomes very great.

"2. Steels containing from 10 to 20 per cent. nickel. The resistance increases again with the amount of nickel. An addition of 0.10 per cent. of carbon increases the ultimate resistance from 42,660 pounds to 92,430 pounds. Such steel containing 20 per cent. nickel has a resistance of 156,420 pounds. If at the same time the carbon increases up to certain limit, a resistance of more than 284,000 pounds can be obtained. The upper carbon content at which the resistance of a 10 per cent. nickel steel begins to decrease again is 0.50 per cent.

"Steels of the second class do not harden much, and do not harden at all when the carbon is higher than 0.10 per cent. 20 per cent. nickel steel never hardens. All are very brittle. They forge and roll well, but when containing more than 0.10 per cent. carbon they cannot be machined.

"3. Steels containing from 20 to 25 per cent. of nickel. Their elastic limit, as well as ultimate resistance, is low. They have great elongation, and are nearly free from brittleness. When forged at a low temperature without annealing, their elastic limit increases notably, and has reached 78,000 pounds, with an ultimate resistance of 113,700 pounds and an elongation of 25 per cent.

"With carbon content of less than 1 per cent. the steel

*These tests are reported in detail, but the results are here omitted as they are by no means conclusive.—Ed.]

can be easily forged and rolled. Steel with 1 per cent. of carbon can be forged between 500 and 1,000 degrees with light blows. Machining is difficult, but not impossible.

"From these tests it results that only the steels of the first and third classes can be used for practical purposes, the steels of the second class being too brittle and too difficult to machine." (A. Abraham in Iron Age.)

The suitability of nickel steel for tires is particularly mentioned. "The usual test of a tire is that it should stand compressing one-sixth of its diameter without cracking, but one of nickel steel stood compression from a diameter of 39½ to 19 inches without signs of fracture. A crack appearing in the metal does not develop as in carbon steel, and this renders it peculiarly applicable for shafts and axles." (W. Beardmore in Jour. I. & S. Inst.)

The experience of one of this committee with two piston rods of commercial nickel steel would confirm in a way this latter statement. After having been in service for two years, transverse cracks apeared extending over about one-third of the circumference of the rods and of a maximum depth of $\frac{1}{4}$ inches. When removed, however, the rods could not be broken with the heaviest sledges, one being finally fractured in a hydraulic press, while the other had to be drilled in two. These rods appeared to be soft, and the wearing surface did not glaze over, although no unusual wear of metallic packing was observable.

A user of nickel steel locomotive crank pins states that there semed to be quite a variation in the hardness of different pins in the same lot, as evidenced by the behavior of the metal under the tool, and that the reduction in diameter of the softer pins under the pressure of the burnishing tool was particularly noticeable.

Another reports the trial of nickel steel bolts in place of iron (where the latter were failing and could not be made larger), but with no benefit.

A few members reported the recent use by them of nickel steel crank pins for locomotives, piston rods and fire boxes. Among the few comments made was one which referred to the rough appearance of nickel steel fire-box sheets, and another that it appeared, from a limited number of nickel steel piston rods in service, that they were more apt to break than those of ordinary steel. (No particulars given.)

It has not been attempted to touch on the use of nickel steel as a material for castings, but much may be looked for in that direction.

This report is signed by Tracy Lyon, P. Leeds and A. E. Mitchell.

Square Head Bolts and Nuts: Standards for Pipe Fittings.

The committee reviewed the work of the American Society of Mechanical Engineers to bring about uniformity in the dimensions of pipe and pipe threads, a report of which is to be found in the Transactions of that body for 1896. That investigation resulted the same year in the adoption of the Briggs standard of thread gages by the Wrought Iron Pipe Manufacturers of the United States, and also by the makers of brass, iron, steam and water pipe. The committee continues: Notwithstanding the action taken by the Manufacturers of Wrought Iron Pipes and Boiler Tubes and Pipe Fittings, recent investigations made by the committee disclose the fact that so far as the ¾-inch and 1-inch sizes of pipes are concerned, certain manufacturers are still adhering to the standards they had in use in 1886. The variation from the Briggs standard in these sizes of pipes is due to the fact that some makers use a thicker wall by using a larger outside diameter than called for by the Briggs tables, this difference averaging about .03 of an inch. As a consequence the couplings of these thicker pipes are somewhat large for pipes made in accordance with the Pratt & Whitney Briggs standard, and the pipes themselves somewhat large for the couplings made to the Briggs standard.

From the answers received to the circular letter sent out we draw the conclusion that very little trouble is experienced because of lack of uniformity in the threads of wrought iron pipes and couplings; that there is a general understanding that the Briggs table of threads and dimensions is the adopted standard. Out of about sixty replies to this circular we find but eight roads which specify by what templates the Briggs standard shall be tested, and of these eight, six specify the Pratt & Whitney Co. templates.

In view of the foregoing facts we recommend the adoption of the Briggs standard, as determined by the Pratt & Whitney Co. gages, as the standard threads for wrought iron pipe and couplings.

So far as we have been able to determine, there is no universal standard for the threads of wrought iron pipe union nuts, though the sleeves of the unions are quite generally threaded in accordance with the Briggs standard. Because of the great number of standards used by the different manufacturers, the number of changes made in the chairmen of the committees, the lack of promptness in receiving promised samples, and several other causes producing unavoidable delays, we are unable to make any recommendation concerning Standard Threads for Wrought Iron Pipe Unions at present. We believe it would be wise if such a general standard could be adopted and would recommend that this portion of the work be continued."

This report is signed by C. H. Quereau, W. H. Marshall and H. Monkhouse.

National Local Freight Agents.

The 12th annual meeting of the National Association of Local Freight Agents' Associations was held at Norfolk, Va., June 13. About 150 delegates were present.

Mr. Malcolm Townsend (P. RR.), of New York, President, called the meeting to order, and 33 local associations responded to roll call. Addresses of welcome were made by Mayor Johnson and Mr. M. B. Crowell, President of the Norfolk Association, and were responded to by Mr. Lot Brown (C., B. & Q.), Chicago. The reports of officers and standing committees were presented in rapid succession. Four deaths of individual members occurred during the past year. Fifty-one Associations with 492 members now compose the National Association. Leavenworth, Kansas; Worcester, Mass.; Newcastle, Pa., and Macon, Ga., were admitted at this meeting. The special committee to secure an amendment to the law governing the transportation of freight while in bond, by which its movement might be hastened when in small lots, reported through its Chairman, Mr. Townsend, the passage of a law by Congress, House bill 10,459. The committee was given a vote of thanks. Many importers in inland cities are profuse in their expression of gratitude to this Association for its interest in their behalf. Under this law the customs regulations are relaxed so that a railroad company, by giving bonds, may load, at a port of first entry, both bonded and free goods in the same car and thus facilitate the prompt movement of bonded freight to the interior without waste of car space.

The special committee to secure the co-operation of banks in facilitating the handling of drafts with bill of lading attached, and to secure a uniform method of identifying the bill of lading as the original, reported progress. The endorsement of a number of banking associations has been secured.

A number of important changes were made in the rules, the most important one being the curtailing the power of the committee of arrangements, making it necessary for it to secure the approval of the president of the association before publishing its entertainment programme. Another provides for printing in the minutes the names of associations that are absent and those present at each session of the convention and requiring the secretary to take bids for printing.

The preliminary routine business having been disposed of the convention on Wednesday took up the topics presented by the several associations.

Buffalo's topic, "What constitutes bulk freight?" brought out an extended discussion of the prevailing custom at all of the cities of the United States. At some points railroad companies are paying thousands of dollars monthly to help consignees and shippers handle team-track car load freight, which at other points is handled entirely without expense to the railroad. The variety in existing conditions was surprising and it was agreed that some action ought to be taken which would make practice uniform and relieve the carriers of such expense as was not contemplated by their contract or bill of lading.

Chicago introduced the subject of type machine work in way-billing, expensing and making statements; and by vote the Association expressed its belief in the practicability of the use of machines in such work, but expressed the hope that manufacturers would be able to still further improve their machines.

Cincinnati told of the serious delays occasioned by freight not being prepaid or guaranteed, especially on business interchanged between Official Classification territory and that of Western or Southern, in which the requirements were not the same; also when destined to prepay stations, on foreign roads. The matter was referred to the Conference Committee to take up with traffic officials.

Fort Wayne argued for uniform classification and was unanimously agreed with.

Louisville called attention to the hardship upon carriers of the responsibility fixed by law on carriers for the proper affixing of revenue stamps to articles required by revenue laws to be stamped and the proper cancellation of such stamps on empty packages offered for shipment. On motion a committee of three, to be headed by the President, was appointed to petition Congress for relief to the carrier companies.

Milwaukee recommended action looking to abolishing tracers, so far as possible. The recommendation was approved.

St. Joseph advocated that shippers of "order" shipments be required to note on shipping instructions "Permit inspection," or "Do not permit inspection," before their bills of lading for such shipmenths be signed. Referred to a special committee to call to the attention of the Classification Committee.

St. Louis called attention to the benefit derived from the adoption of a rule requiring all less than car load shipments to have destination at least marked in full on each package. Referred to Conference Committee with instructions to secure the universal adoption of such a rule.

A paper was read by Mr. James V. Braden (P., C., C. & St. L.), of Wheeling, on the Jurisdiction and Duties of the Local Freight Agent. Mr. Braden briefly reviewed the general duties and qualifications of the local agent, calling attention to the fact that his work is not bounded by geographical limits, and to the necessity that he be an all around man of good judgment, keen perception, courteous, and of irreproachable character. While praising the work already accomplished by the association, Mr. Braden pointed out that there was yet much land to be conquered. Why should there be so many other agencies to do things which the local agent ought to do? What do weighing and inspection bureaus accomplish more than to correct the neglect of the careless or indifferent agent? What car service association amounts to anything without the co-operation of the local agents? Why do we have commercial and contracting agents to attend to business which is clearly within the field of the local agent? If we are not incompetent for our places, let us remove the distrust and other obstacles and take the place which belongs to us. The time is coming when the local agent will have charge of the entire business of a station; he will be required by his employer to belong to a local association and to take his proper place in the commercial circles of his city.

The election of officers resulted in the following selections, all but Mr. Lamb being re-elections: President, M. Townsend (P. RR.), New York; Vice-President, E. T. Lamb (Southern Ry.), Norfolk, Va.; Secretary, F. J. Vandholtz (N. Y. C. & H. R.), New York; Treasurer, C. H. Newton (Wabash), Fort Wayne, Ind. The next place of meeting is Boston, and the date June 12, 1900.

Much of the profit of this gathering was in the informal discussions, in and out of the meeting, which are too fragmentary to report. The Norfolk Association provided healthful, educational and very agreeable amusement and recreation, by steamboat and trolley rides to the principal shipping points and to the ship-building dry docks. In the evening the ocean bathing resorts were visited and much enjoyed.

Additional Exhibits at the Mechanical Conventions.

In addition to the list published last week, the following exhibits were shown at the conventions:

Acme Pipe Clamp Co., St. Louis, Mo.—Samples of clamps for air brake pipes.

American Arithmometer Co., St. Louis, Mo.—A full-size model of the Burroughs registering accountant or adding machine.

Bethlehem Iron Co., Bethlehem, Pa.—Nickel steel crank pins, piston rods and axles.

Boston Belting Co., Boston, Mass.—Samples of air brake, steam and car heating hose and rubber mats and matting.

Corning Brake Shoe Co., Corning, N. Y.—Samples of the Corning brake shoe.

Composite Veneering Co., New York, N. Y.—Samples of composite veneering for interior decorations for passenger cars and buildings.

Crane Co., Chicago, Ill.—High steam pressure valves and new air-brake union.

Detrick & Harvey Machine Co., Baltimore, Md.—Model of the Adams bolt-threading machine.

G. T. Eames Co., Kalamazoo, Mich.—A full size model of the Yankee twist drill grinding machine.

Daniel Gardner, Newburgh, N. Y.—Model of the Gardner safety window sash holder and combination lock and lift.

Gould Coupler Co., New York, N. Y.—The exhibit of this company consisted of Gould M. C. B. freight, passenger and tender couplers, the Gould steel platform and the Gould spring buffer blocks, all full size.

George C. Harlin, Chicago, Ill.—Model of the Harlin car coupler.

Kendrick & Co., Glenwood Springs, Colo.—Patent folding car steps.

O. H. Jackson, Prescott, Ariz.—Canaday's improved throttle lever.

The Joyce-Cridland Co., Dayton, O.—Seventeen full size jacks for railroad work.

Philip S. Justice & Co., Philadelphia, Pa.—Three full size models of Reliance hydraulic jacks.

David Manuel, Hyde Park, Mass.—Model of the Manuel flush freight car door.

Mason Regulator Co., Boston, Mass.—Air brake pump governor, balanced valve, damper regulator, locomotive reducing valve, pump governor, pump pressure regulator, reducing valve and steam pump.

Pantasote Company, New York, N. Y.—The description of the exhibit of this company as given last week did not do justice to the handsome display made. The Pantasote car curtain materials, headlinings and upholstery goods were shown in an especially built section of a Wagner parlor car. The seats were upholstered in a new design of Pantasote and the whole exhibit was lighted by Pintsch gas, making one of the most attractive displays of the conventions.

Pearson Jack Co., Boston, Mass.—In addition to the car raising jacks referred to last week, the Pearson king-bolt clamp was shown.

Pettingill & Lamb, Denison, Ia.—Automatic steam and air coupler; also model of car coupler.

Safety Car Heating & Lighting Co., New York, N. Y.—The exhibit of this company consisted of several lamps lighted by Pintsch gas, shown in connection with the handsome exhibit of the Pantasote Company, of New York.

Sheffield Car Co., Three Rivers, Mich.—Velocipede hand cars, Nos. 1 and 16; gasoline motor car; two-seated bicycle hand car; track gages and levels and cattle guards.

J. M. Smith, Marshall, Mich.—Full size model of the Commonsense freight car door.

Standard Paint Co., New York, N. Y.—P. & B. Ruberoid car roofing and flooring and preservative paints for iron and wood.

Thornburgh Coupler Attachments Co., Detroit, Mich.—Draft rigging and coupler.

Walworth Mfg. Co., Boston, Mass.—Samples of Stillson, Allston and Hall pipe wrenches; die plates; dies; pipe taps, cutters, drills and reamers; vises; gate valves and steam traps.

Waterbury Tool Co., Waterbury, Conn.—Samples of

the William's Universal ratchet for drilling holes in places where an ordinary ratchet would fail to work for lack of room.

Weber Car Axle Box Co., San Francisco, Cal.—Model of the Weber car axle box and dust guard.

C. Yingling & Sons, New York, N. Y.—Model of the Yingling shaking grate.

The Railroads of Egypt and the Soudan.

Lord Cromer, British Agent and Consul General in Egypt, and the actual ruler of that country, has submitted his latest annual report under the date of Feb. 26. We find therein some interesting facts about the railroads of Egypt and the Soudan.

To begin with the Soudan: It appears that the expenditures on the railroads of that country consequent upon the military operations which began with the spring of 1896, have amounted to £1,181,372. Almost immediately after the battle of Omdurman it was decided to extend the railroad from the Atbara River to a point on the Blue Nile opposite Khartoum, 187 miles.

A temporary wooden bridge has been built across the Atbara and has been available for the passage of working trains since about the third week in January. Probably it will be available up to about the third week in July, when the weight of water in the Atbara flood will be too great to make it safe. The substructure of the permanent bridge, which has steel cylinder piers, has been done by an Italian contractor, and it was expected that this would be finished before the superstructure built by the Pencoyd Iron Works could reach the Atbara, which should be about the first week in June. It seems doubtful if the erection of this can be completed before the flood makes it necessary to suspend operations for the summer. It may be, however, that it will be possible to carry on erecting work through the season of flood. An English firm offered to deliver the superstructure of this bridge in 6½ months at a cost of £10,490. The American bid was for 42 days and £6,500, and the American offer was accepted.

In closing this part of his report Lord Cromer expresses his warm admiration for the manner in which the building of the Soudan railroads has been carried on by the young officers of the Royal Engineers under Lord Kitchener's orders. "It is a work which is most creditable alike to themselves and to the distinguished corps to which they belong."

There is some discussion of the matter of further extensions of the Soudan railroads, and Lord Cromer considers it almost certain that railroad communications will be established between the Nile Valley and the coast of the Red Sea. He does not, however, approve of the route between Berber and Suakin, but thinks that a longer route further south, through a country which is habitable and in which there is water and vegetation, would be preferable. He considers, however, that the most urgent need of the railroad extension is up the Blue Nile to tap the grain country. Grain, at the moment of the writing of this report, was more than five times as dear at Omdurman as it was at Gedarif, a couple of hundred miles away, and it is considered most desirable to arrange for the extension of the railroad to Abu Haraz, 122 miles, as soon as it reaches Khartoum. It is believed that the railroad will reach Khartoum by the end of this year, and that it will be possible to arrange for the extension to Abu Haraz in 1900.

Of course, all of this railroad extension has for its immediate object the political, military and social considerations of the country itself. The main object is to reduce as much as possible the cost and difficulty of government and also to lighten as much as possible the burden of living which is laid upon the people by the very costly and tedious methods of transportation which they now have. Concerning the probable development of commerce into and out of the Soudan, Lord Cromer does not speak with much hopefulness, but he says in the text that this is a subject concerning which nobody is qualified to speak confidently.

The condition of the railroads of Egypt proper is improving slowly year by year. Traffic gains steadily with the growing prosperity of the people and the condition of the lines is gradually being bettered. Still, the rolling stock is inadequate in kind and in quantity, and the track and structures are all lower in standard of weight and maintenance than they should be for proper operation. Lord Cromer considers that there is not the least doubt of the wisdom of the policy of borrowing about seven million or eight million dollars with which to put the Egyptian railroads into thoroughly good working order, but under the present international agreement this cannot be done and a programme of expenditure has been arranged by which about six million or seven million dollars shall be taken from the general reserve fund during a period to extend over five years and expended on the railroads. This will permit the purchase of about 2,700 ten-ton freight cars, 200 passenger cars and 30 locomotives and will enable steel to be substituted for iron on about 550 kilometers of track and will permit 1,500 kilometers more to be properly ballasted. It would also permit the strengthening of some of the bridges. But a proper development of the Egyptian railroads cannot be looked for until the railroad administration is left with a freer hand and permitted to borrow and spend on business principles.

Improvement of the Grand Central Station, New York.

The plans for the improvement of the passenger accommodations of the Grand Central Station, New York City, have been finally approved by Chief Engineers W. J. Wilgus, of the New York Central, and F. S. Curtis, of the New York, New Haven & Hartford, and the work preparatory to the construction of a large waiting room for the use of all the three divisions terminating at this station is to be begun on July 5. The contractors are Messrs. Grace & Hyde, of New York and Chicago, the same who rebuilt the upper stories of the building last year.

The reader will recollect that a comprehensive plan for the improvement of this station was made in 1897 and that, so far as the office portion is concerned, this plan was carried out in 1897 and 1898. (See Railroad Gazette Feb. 19, 1897.) By the plan then made for the main floor, the three waiting rooms now in use for (a) the New York, New Haven & Hartford (b), the Harlem Division of the New York Central & Hudson River and (c) the Hudson Division of the same, were to be abolished and one large waiting room built at the south end for all three divisions, thus making the station a headhouse in fact. The space now occupied by the two last-named waiting rooms was to be devoted to a large outward baggage room.

This plan is now to be carried out on designs made by Mr. S. Huckel, Jr., of Philadelphia, the most noticeable modification from the original plans being in the location and size of the main waiting room. As finally decided on, this will be built entirely within the great arched train shed, and the existing main walls of the headhouse at the south end will remain substantially undisturbed. At the same time the space in the headhouse part of the building, now used for the waiting room and outward baggage room of the New Haven road, will be utilized for ticket offices, vestibules and other accessories to the large waiting room. The second story of the south end, and those above it, remain undisturbed by the changes now to be made. (This is not true, however, of the annex at the east side.)

For the train shed the new plan provides that the whole of the main shed and of the annex to the east of it shall be thrown into a single train house. The east wall of the main shed will be cut open so as to leave practically nothing but a row of columns or supports for the arches and the two tracks between the main shed and the annex will be roofed over. The headhouse of the annex will be incorporated as a part of the new headhouse, as is shown in the drawing. The station of the Manhattan Elevated Railroad, now in the second story of the headhouse of the annex, will remain substantially as at present, though somewhat reduced in size, and there will still be convenient stairways leading to and from the elevated road.

Room for the large new rotunda is made by shortening all of the tracks 73 ft. This diminution of the train accommodations will be partially offset by the extension of the platforms beyond the north end of the train shed. Baggage elevators are to be built, as shown in the plan, so that baggage, carried through a subway, can be loaded into cars some distance farther out than at present. There will be a new overhead foot bridge at 45th street.

An important feature of the work of the designers was the planning of a scheme that could be successfully carried out without serious interference with the immense traffic that flows through the station both day and night. This involved the solution of many difficult architectural and engineering problems.

The architect, Mr. Huckel, has given us the data for the following description:

The grand rotunda will be located directly to the rear of the present headhouse or Forty-second street waiting room. Including the floor area of the present New Haven waiting room, it is 90 ft. wide by 180 ft. long; and it is 36 ft. high in the clear to ceiling. The central portion of the floor, unobstructed by pillars, is about 70 ft. by 155 ft. The ends and sides of this room are divided into arched openings, over which is an ornate frieze and cornice paneled to receive the names of 32 of the principal cities reached by the lines of the Central and New Haven roads. Above this cornice is the ceiling, laid out into rectangular panels containing arched segmental diffusing lights of leaded glass, over which again are the outer sky-lights all arranged with a view to sufficient light and ventilation.

This rotunda is entered through spacious vestibules and approaches from all four sides. The ticket offices are on the south or Forty-second street side. There are two with 15 windows each (including sleeping car offices), one being for the use of the New York Central and the other for the New York, New Haven & Hartford. There are separate windows for ladies. At the east end of the room is the marble staircase. Here is the approach to the station of the Third Avenue Elevated Railroad, which is in the second story over the western part of the carriage drive. The passage to the elevated station is indicated in the plan by dotted lines. The package room, a news stand and the men's smoking room and lavatories are at this end of the rotunda.

The west end of the rotunda is approached through a vestibule 55 ft. wide, opening on to Vanderbilt avenue. At this end are located the telegraph and telephone offices; the ladies' waiting room and retiring room, ladies' tea room and flower stand. Here also is a "palm room," fitted up in a novel manner. The design has been to provide all needed facilities for a lady arriving from a tedious journey. Before leaving she can make her toilet in a pay or private lavatory supplied with hot and cold water, mirror, etc., with a maid in attendance; and in the tea room she can be refreshed with tea and biscuit and other refreshment at small individual tables. At the east end of the rotunda, in the entresol story, is a men's bath establishment, smoking room and lavatory.

The Bureau of Information is to be in a pavilion exactly in the center of the length of the rotunda, on the side next to the concourse. The redemption of tickets bureau is in the entresol story at the west end of rotunda.

The lower portion of the waiting room is finished entirely in Italian marble of three kinds. The base is Serra Vozza marble, the pilaster work of Francis Critti marble and larger panels of wainscot entirely of Breche violet marble. White Italian marble is used throughout for all the vestibules and the floors of the main waiting rooms and rotunda. This is relieved with a border of different color and pattern. The upper decoration of this main room will be ornate, but in keeping with its purpose and surroundings, and will finally be finished in a color scheme that will give the best effect in color and utility.

The woodwork in this room will be mahogany. At the east end over the center arch and in the spandrel surrounding will be placed a large clock of ornate design, worked into the surrounding detail, while at the opposite or west end of the room and facing the clock will be placed a large bronze tablet in low relief, commemorative of the history and development of railroad transportation. Marble drinking fountains will be placed at convenient points both in the rotunda and on the public concourse. The rotunda will be lighted from the ceiling and cornice by clusters and rows of incandescent electric lights arranged to give a well distributed light.

The general style of the new work is French Rennaisance, but there is maintained an air of simplicity and dignity consistent with the use and purpose of the building. The character of the interior of the rotunda, especially its elevation to the north (toward the trains) is somewhat like that which has been adopted in the new station of the Orleans railroad at Quai D'Orsey, Paris, which is now in course of erection.

The concourse or public waiting space is one of the most important features of the new work. It extends almost the full width of the station from the vestibule on Vanderbilt avenue on the west, to Depew place on the east, a distance of 325 ft. At the west end it is 30 ft. wide and at the east end 100 ft., exclusive of a runway for baggage outside the grill work. It is believed that this will afford space sufficient to prevent crowding, even on holidays. The concourse is approached from all sides and all streets, as well as from all tracks and platforms, and has an area of 12,500 sq. ft., exclusive of the baggage runway.

The changes in the trainshed will be radical. All the tracks and platforms will be newly located and so arranged as to provide twenty tracks in pairs. The platforms of the annex will be raised to the level of those in the main shed. The tracks will be numbered from 1 to 19, beginning at the east side, and at the gates where passengers enter the longitudinal platforms there will be electric signs and number indicators to announce time of leaving, number of track or gate and stations to which train goes. The 19 tracks will be nearly 600 ft. long under cover.

The entire length of the building on Vanderbilt avenue, from the new vestibule or lobby northward is by the new scheme devoted to baggage. This space is 540 ft. long and the full width of the building at that side of the shed. Spaces are set apart for receiving the various kinds of baggage, express, etc., and also for storage. Incoming baggage will be handled on the east side of the station as at present.

There will be a tunnel or subway under the tracks and platforms across the entire station at Forty-fifth street, just beyond the outer end of the trainshed proper. This will be connected with both the incoming and outgoing baggage platforms and will be also used for conveying the mails across the yard at this point. Trucks may be run through it to any platform and elevators will lift them to and from any platform. It is 18 ft. 6 in. wide and 9 ft. 6 in. high, lined with glazed brick, lighted in day time with vault lights and at night by electric light.

Accommodation is provided, as shown on the plan, for the General Manager, the Station Master, the Station Agent of the New York Central, the Baggage Master and Baggage Cashier, Mail Agent, Express

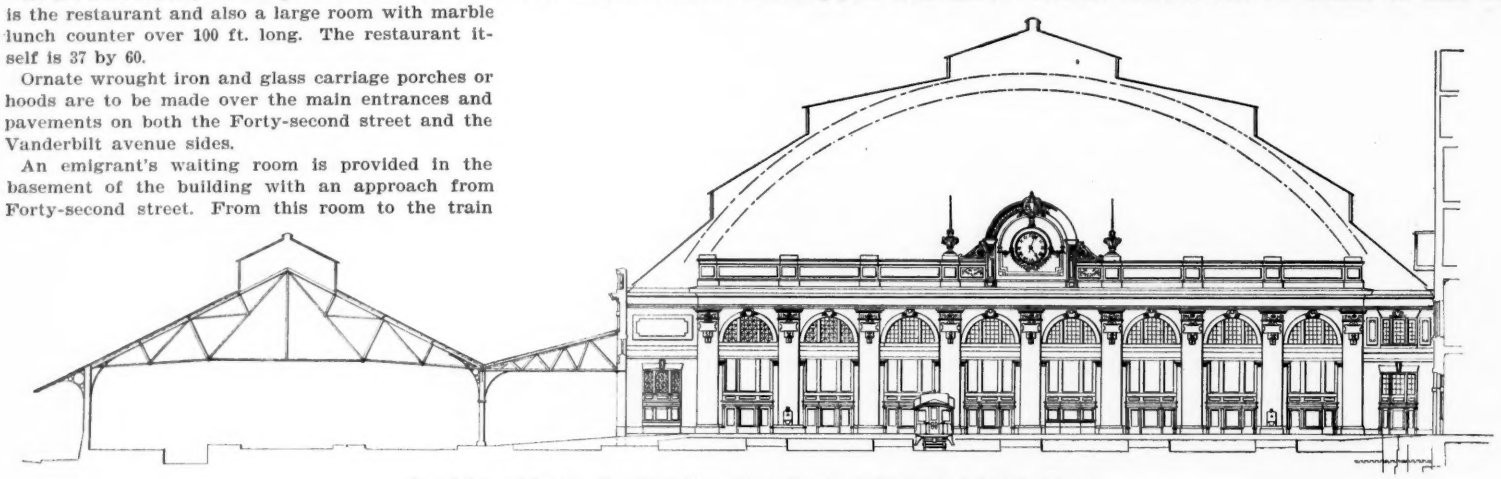
Agent's offices, Baggage Foreman and cab stand offices.

At the southeast corner of the station and separated from it by an entrance to the concourse, is a cab stand under cover 37 ft. x 86 ft. To the rear of this is the incoming waiting room. From this corner the restaurant and Elevated Railroad are reached by an elevator and four staircases.

In the second story of this portion of the building is the restaurant and also a large room with marble lunch counter over 100 ft. long. The restaurant itself is 37 by 60.

Ornate wrought iron and glass carriage porches or hoods are to be made over the main entrances and pavements on both the Forty-second street and the Vanderbilt avenue sides.

An emigrant's waiting room is provided in the basement of the building with an approach from Forty-second street. From this room to the train platforms there will be a tunnel beneath the main floor of the rotunda.

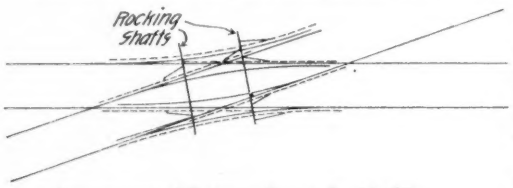


Grand Central Station, New York City—Cross Section in Train Shed, Looking South.

The Yard.

During the past six months extensive changes have been made in the tracks leading to the Grand Central Station and also in the switches and signals, and we show herewith a diagram of the tracks as rearranged. The principal difference made in the layout of the tracks is in the addition of long leads, so that when two trains start out simultaneously they can run farther without interfering with one another; the inward side is similarly improved. The connections from the storage tracks at the west side of the yard with the tracks in the western part of the trainshed have also been much simplified.

To carry out the changes the signal cabin (No. 1)



Arrangement of Detector Bars at Double Slips.

was lengthened 20 ft. and an entirely new machine was put in. This machine has 164 levers which are divided into four groups, this being the first time that the levers in this yard have been grouped. All of the wire connections to the signals have been taken out, and pipe is now used in every case. Iron foundations for signal connections are used throughout. The work of replacing the machine in the cabin and putting in the new leadout was done by the Union Switch and Signal Co. under the supervision of Mr. George H. Pfeil. The work of reconstructing the tracks and the ground connections was done by the railroad forces under the supervision of Mr. Frank S. Curtis, who, however, resigned to take a position on the West Shore before this work was wholly completed.

The new machine has 52 levers for 126 switches and five locks; 41 levers for 121 facing point locks and 67 levers for 79 signals. There are four check levers introduced to simplify the locking, four idle levers and four blank spaces. The check or locking levers are Nos. 40, 41, 53 and 115. The first machine built in this yard, fifteen or twenty years ago, had, we believe, only 56 levers.

The changing of the switches and signals was an exceedingly complicated work, as the traffic of the yard is so heavy that in nearly every part the tracks are worked up to their full capacity for several hours every day; only a very small part can at any time be closed to traffic. The delays to trains were, however, very slight.

Meeting of the Master Car Builders' Association.

The thirty-third annual convention of the Master Car Builders' Association was called to order at 10 a. m. Wednesday, June 14, at Old Point Comfort, Va. Hon. Charles T. O'Ferrall, ex-Governor of Virginia, gave an address of welcome, after which the President, Mr. C. A. Schroyer, read his annual address.

He reviewed the work of the M. C. B. Association during the past year and the committee reports, extracts from which were published in our last issue. Attention was especially called to the question of reducing the time spent at the conventions which was to be brought before the meeting for action. Also, it was suggested that representation in the Association be changed from a car basis, where eight wheels are considered a car, to a basis which would take account of the fact that many old cars are being replaced by a smaller number of large capacity ones, so that while the tonnage capacity of many roads has largely increased their representation in the Association has decreased. No recommendations were made in the address.

The report of the Secretary showed that the present membership is 458, divided as follows: Active members, 260; representative, 191; associate, 7. The number of cars represented is 1,348,131, an increase of 100,000 since the last report. The balance of receipts over expenditures was $454.70. The report of the Treasurer showed that the balance on hand was $8,893.12. The dues for the ensuing year were made the same as those of last year.

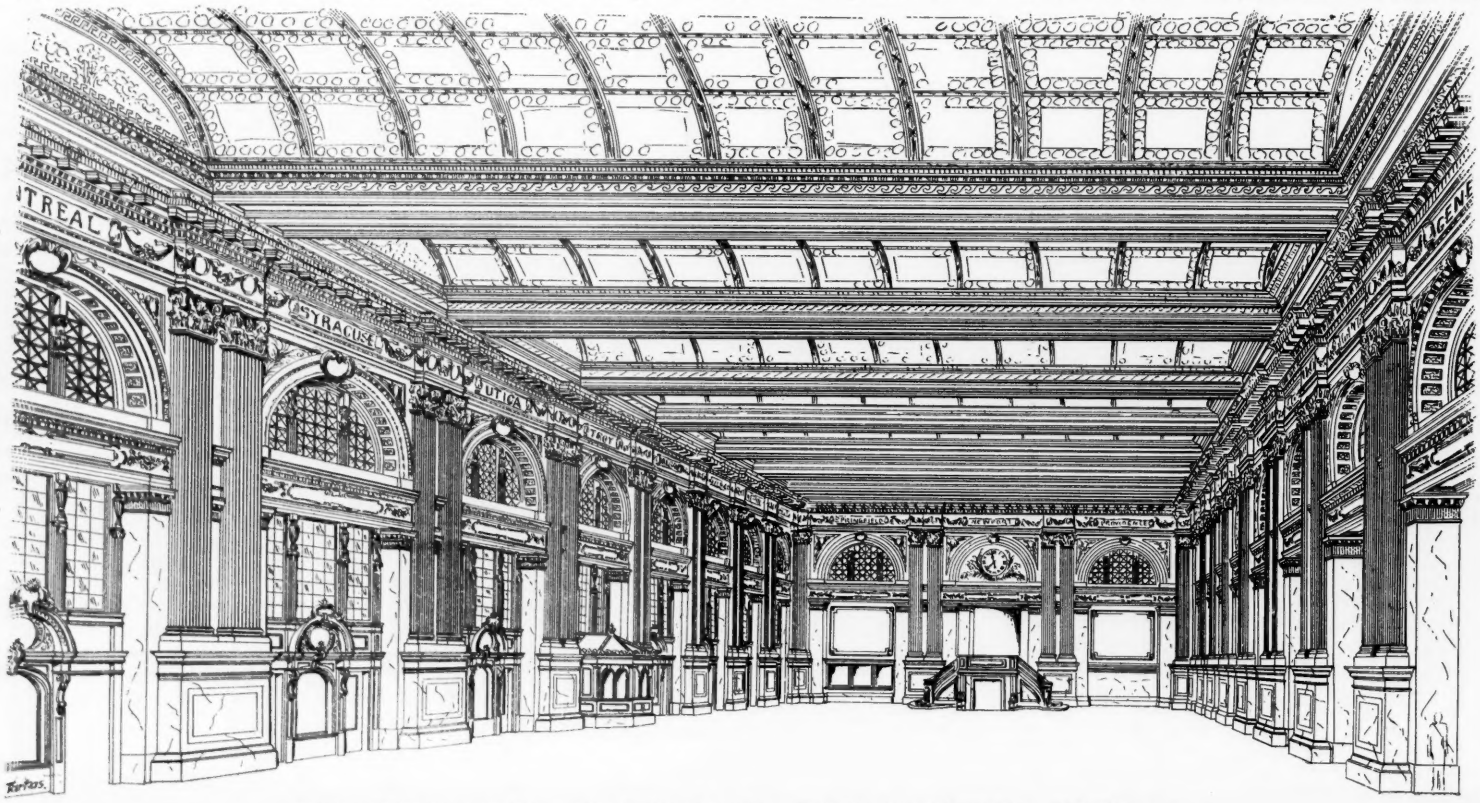
The noon hour having arrived, the topical discussions were taken up.

Is a lock set and a knuckle-opening device in M. C. B. automatic couplers essential to completely fulfill all the requrements of an automatic coupler?

Mr. W. S. Morris (Chesapeake & Ohio).—In my opinion, the law does not require a coupler that will perform any further duty than is imposed upon it in the words: "Coupling automatically by impact, and which can be uncoupled without the necessity of men going between the ends of the cars." Experience has shown that the lock to lock can be considered essential to the prevention of creping of locks or pins.

The knuckle opener and lock set do not appeal to me with the same force; but still they have points that may be considered in their favor, and unless a weakening of the coupler be introduced the knuckle opener and lock set have their own field for usefulness. It may be said, however, that the foregoing does not flatly answer the question put by the committee for the benefit of the members. Therefore, while the provisions of the act of Congress do not indicate that the lock set and knuckle opening devices are essential in an automatic coupler, inasmuch as in each device has been found automatic features that improve upon conditions where they are omitted, it is the opinion of one of your members that a lock set and knuckle opening device in automatic M. C. B. couplers are essential to completely fulfill all the requirements of an automatic coupler.

Mr. S. P. Bush (Pennsylvania Lines)—I feel a good deal as Mr. Morris does, that there are some things



GRAND CENTRAL STATION, NEW YORK CITY—NEW GENERAL WAITING ROOM, LOOKING EAST.
Samuel Huckel, Jr., Architect.

about a coupler that are absolutely necessary, and other things which might be considered desirable features. The automatic coupler as we have seen it up to the present time has possessed in the main the necessary features. It will be remembered that most of the couplers which were introduced in the beginning provide a knuckle opening device and the feeling must have been prevalent at that time that it was desirable to provide a coupler which would make it unnecessary for an operator to go between the cars at any time. To-day I believe it is quite as desirable.

The other feature in the discussion, the lock set, seems to be one of considerable importance from an operating standpoint, the standpoint of economy in operation. One of the troubles which we have to-day is the fact that the uncoupling rod or chain is often out of adjustment; sometimes it is too long and sometimes it is too short. In many cases if the chain is too long, and if the lock set consists of a bracket placed on the end of the endsill, or near the end of the car, and if the uncoupling rod is set on that bracket, then the lock will not lift high enough to permit the knuckle to clear or become unlocked, which is quite a disadvantge. That often necessitates a brakeman or switch man running along when the car is moving, holding the lever up higher than the bracket, and that is done with at least a great deal of inconvenience. It takes time to do it. Again, if the chain is too short, and some lost motion gets into the draft rigging, there is danger that the lock will be lifted by the chain. This causes break-in-twos. These two features are very important.

The third feature is with the lock set inside of the coupler, which is generally known as the lock set to-day, the operation of uncoupling simply becomes one of throwing the lever up and letting it fall to its normal position without having a special unlocked position for the lever. That facilitates the work of cutting trains and reduces the time required to do it. I think these are important reasons in favor of the lock set.

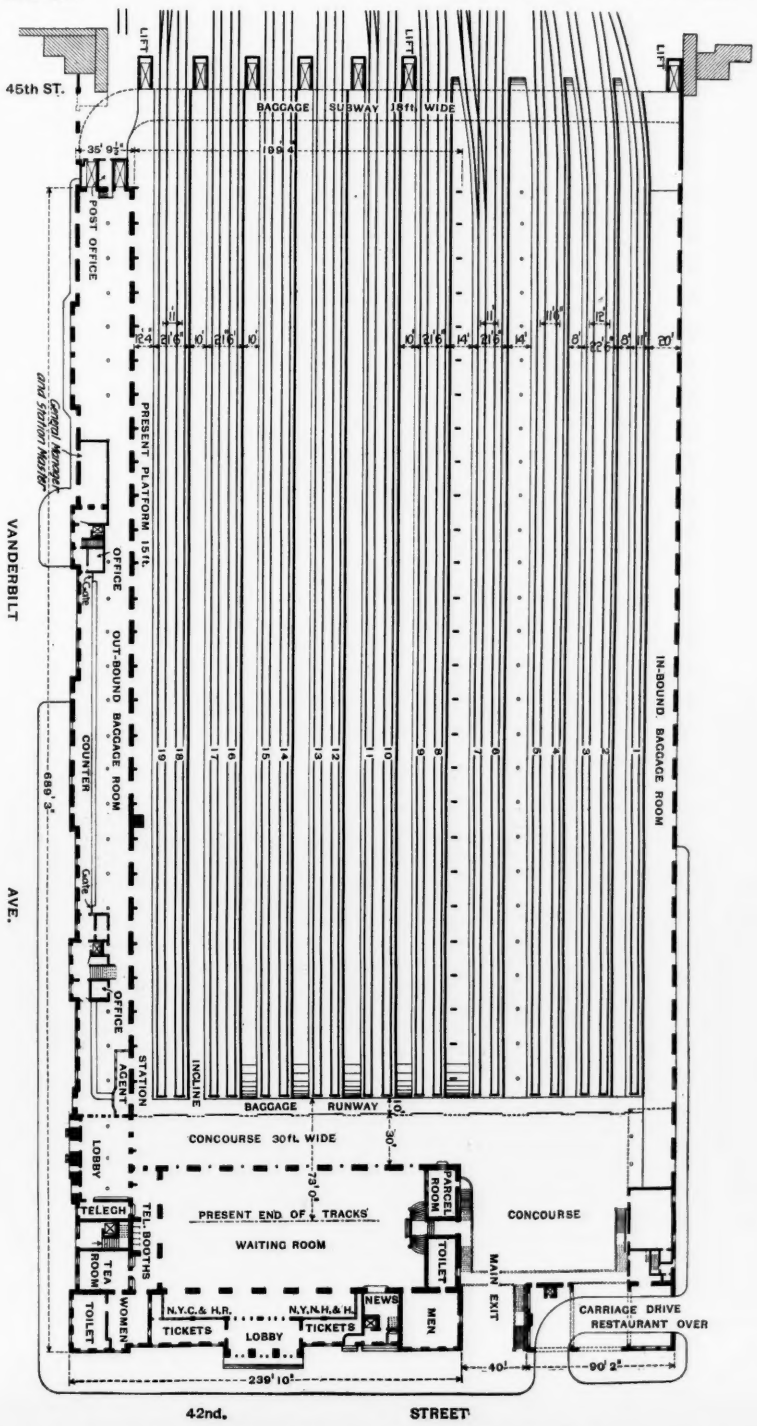
Mr. Charles Waughop (Joint Inspector, St. Louis)—I believe that 95 per cent. of the knuckle opening devices are used in the uncoupling of cars; in the case of the other 5 per cent. the trainmen will open the knuckle without looking to see if the car is equipped with the opening device.

In the interchange of passenger equipment cars, what is and should be the practice in regard to charging for Pintsch gas in cars lighted by that system?

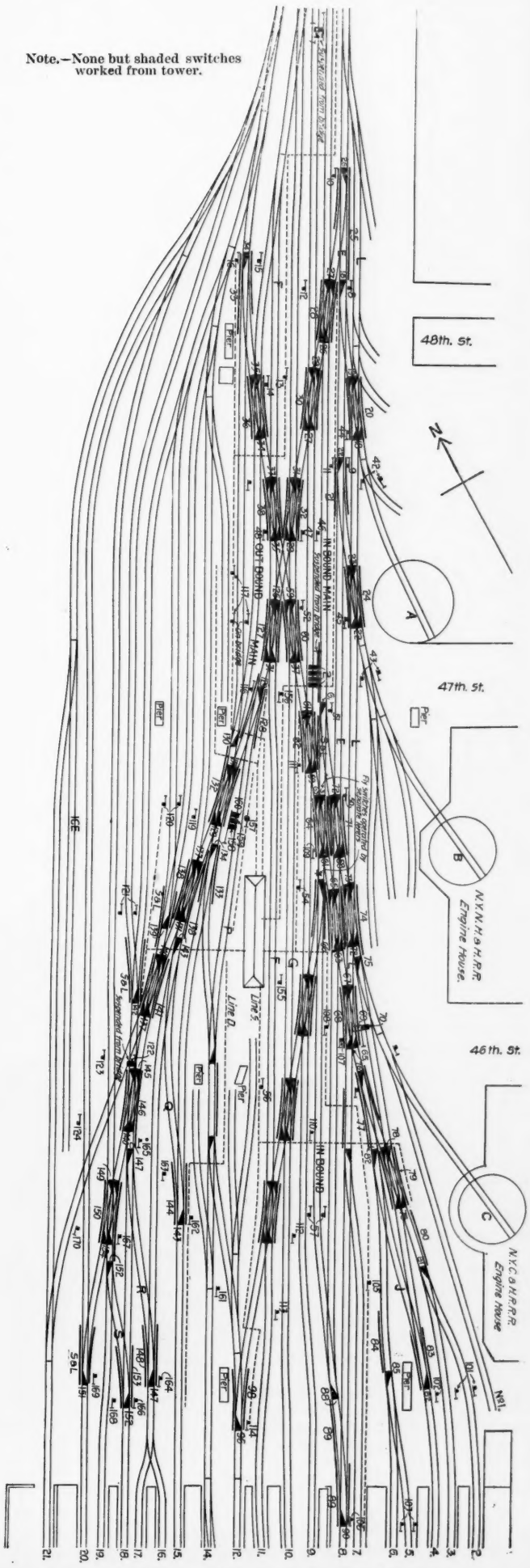
The President—The discussion was to have been opened by Mr. Frank Rearden, Superintendent of Locomotive and Car Department, Missouri Pacific, but he is not present. I will ask Mr. Rhodes to open the discussion in his absence.

Mr. G. W. Rhodes (Chicago, Burlington & Quincy)—The general use of Pintsch gas often makes a mixed question at interchange points in the interchange of sleeping cars as to how we are to get a return from the gas that is in the car when it leaves the railroad which has been running the car. One Master Mechanic suggested to me what seems to be an easy solution of the matter, and that is, to use an M. B. C. defect card. For instance, the Union Pacific delivers a Pullman car to the Chicago, Burlington & Quincy with ten atmospheres of gas, the Burlington should give the Union Pacific an M. C. B. defect card for ten atmospheres of gas, charged at the regular price for the gas. When the car reaches Chicago we turn it over to the Pullman Company, and if it has but eight atmospheres we would ask the Pullman Company to give us a defect card for eight atmospheres. It goes to their shop, and they overhaul the car, and possibly it comes back to us with five atmospheres of gas. We in turn give them an M. C. B. defect card for five atmospheres. If we charge the car on our line and deliver it to the Union Pacific at some later day with thirteen atmospheres of gas, they give us a defect card for thirteen atmospheres. If the committee which is to suggest recommendations for an appendix to our rules will embody a rule to that effect, that an M. C. B. defect card for the amount of gas registered on the car be always given by the receiving road to the delivering road, it will settle that question in a satisfactory way.

Has the splicing of air-brake hose been found to be good



Plan for Reconstruction of the Grand Central Station, New York City.



Yard of the Grand Central Station, New York City.

and economical practice, and should cars so equipped be passed in interchange?

The President—Mr. F. W. Braierz, Assistant Superintendent of Machinery, Illinois Central, was to have opened this, but in his absence the Chair will call upon Mr. Barr.

Mr. J. N. Barr (Chicago, Milwaukee & St. Paul).—We have had a good deal of experience along this line, and we find it very good and very economical practice. In fact, our records show that the percentage of spliced hose removed on account of being defective is less than the percentage of new hose.

Mr. J. W. Luttrell (Illinois Central)—The Illinois Central adopted the practice of splicing air-brake hose about three years ago. We have never had a complaint of the failure of the air-brakes due to spliced hose. We are splicing about 1,200 hose per year, at a cost of 14 cents each. The spliced hose is only used on the cars of the Illinois Central Railroad. When we furnish hose to foreign cars, new hose is supplied. I think we have made tests enough to justify me in saying that the spliced hose is perfectly safe if you use care and judgment in the selection of the hose spliced. The majrity of the hose spliced is such hose as has been damaged by unfair usage, rips, cutting with a knife, etc.—hose which has been in use only a short time. Damaged hose, which show that they have about completed their guarantee, are thrown in the scrap pile.

Mr. S. King (Grand Trunk)—There are some railroads using a casting 5½ to 6 in. long, and causing the same trouble at the splice that is now caused by the upper nipple, bending the hose and fracturing the inside tube, and bringing about the same defect for which the original hose was removed.

Mr. Wm. Garstang (Big Four)—In 1897 it was the unanimous vote of this Association that it was safe and economical practice to use spliced hose. We have experimented with it more or less since that time and have had very satisfactory results. On the Big Four road the splicing of hose means a saving of between $250 and $300 a month. I have not known of a case of spliced hose causing a delay or failure in a train. I hope that when the revision of the rules is taken up there will be a rule inserted making cars with spliced hose interchangeable and acceptable.

Mr. J. Hodge (Atchison, Topeka & Santa Fe)—We have used spliced hose for some months and it has given entire satisfaction. We have never found a failure in one of these where there was good judgment used in selecting the hose and making the splice.

Mr. W. S. Morris (Chesapeake & Ohio)—Mr. Garstang suggests that a rule be made that cars with spliced hose be passed in interchange. I am about the only one, I believe, that objects to spliced hose; who is willing to acknowledge it in the face of all the evidence that has been presented in favor of spliced hose. We have a mountainous road and we do not wish to take any chances. We handle heavy and long trains. The bursting of a hose, new or spliced, means considerable damage in our case. I have found some spliced hose where one end of the hose was new and the other end was long past the time limit guarantee given by the maker of the hose. I am afraid of that class of hose. We consider it unsafe practice in the mountains. We do not refuse the foreign cars with spliced hose, but we take the spliced hose off and use it on the lines that do not object to it. We are buying the finest class of hose, under rigid specifications, and are having very much less trouble than we formerly had. Our bill for hose removed is about $200 a month—that is for replacing hose removed.

Mr. J. W. Luttrell—When we first went into the matter we issued a circular letter to all freight train conductors to report any case of delay or failure which, in their judgment, was caused by a spliced hose. In over three years we have not received a train report showing that we have had an accident with spliced hose.

Mr. R. E. Smith (Atlantic Coast Line)—The Atlantic Coast Line has been splicing hose for about two years in a substantial manner, and testing them to 200 lbs. pressure, and the results are entirely satisfactory. As far as using spliced hose on passenger equipment is concerned, it seems to me it is not open to any more objection than in freight service, for the reason that passenger cars usually receive closer attention than would be given to freight cars.

Mr. J. Tonge (Minneapolis & St. Louis)—For some two years we have used spliced air-brake hose, but at the commencement we made a suitable nipple, so that the same size passage is in the nipple as in the hose. It has given excellent service, and I see no objection to using it. I think if the Association passes on this it should adopt a standard size of nipple.

Mr. Charles Waughop—At all joint points of inspection in the United States, except Kansas City, there has been no objection raised to passing cars equipped with spliced hose. A joint evidence card is allowed, and if a foreign car it is passed by on its record. Kansas City, I believe, allows no spliced hose to pass west of that point.

Mr. G. W. Rhodes—I have listened to this discussion on spliced hose with quite a little interest, because we never like to be alone in anything. Four or five years ago, when this subject was first brought up, some comment was made as to what a fool a man was to propose a discussion on splicing hose. I am glad to see so many more fools with me on this subject. I think the remarks which Mr. Morris made are very good, and ought to receive serious attention. My argument is that any man who can use a second-hand hose can use a spliced hose. A serious mistake, however, is made in this way—that at some of the points where they splice hose they will take a hose which has failed near the nipple, through deterioration of the hose and will splice that hose. I think that is wrong practice, and that is the practice which Mr. Morrison objects to, very properly. If the railroads will use the same judgment in splicing hose that they do in using second-hand hose, we will have no trouble from spliced hose.

Fastening of ladders, handholds, brake wheels and brake shaft brackets on freight cars and their inspection, from the standpoint of greater safety to trainmen.

Mr. E. D. Bronner (Michigan Central)—There are three classes of ladders largely used: First—Iron rounds, fastened to the framing of the car with bolts or lag screws. Second—Iron rounds, fastened to wooden side pieces by bolts or lag screws, these wooden side pieces being generally bolted to the body of the car. Third—Wooden rounds, on wooden side pieces bolted to the car body.

The conditions in regard to ladder rounds and handholds are that bolts are used to a very small extent and lag screws seem to be the favorite method of fastening. Ladders consisting of iron rounds fastened to the car framing by lags are used on a large majority of the cars operating in our part of the country.

The general condition of ladders and handholds seems to be improving of late years. Ladder rounds fastened by other methods than bolts or lag screws seem to have about disappeared. The dropping of the 23 conditions in reference to brakes from the rules in 1897 has had no bad effect.

The best type of ladder which is used to any extent is the ladder which consists of wooden side pieces bolted to the frame of the car with iron ladder rounds bolted to these side pieces, all nuts being on the outside and riveted over. It is safer for trainmen and easier to inspect them than any other in general use. Separate rounds like the common ladder if bolts were used with nuts on the outside instead of lag screws would be preferable where a side ladder is used, as cornering or scraping would not be so liable to destroy the entire ladder.

There are some cars using the common iron ladder rounds having the end for the bolt hole turned at right angles to the center line of the round, where they have been applied to the car with this end for bolt hole turned down, bringing the bolt or lag below the ladder round. This application is very bad, as there is a strong tendency to break the bolt or lag. They should be applied as they are by a majority of designers with the supporting bolt or lag above the line of the rounds.

The fastening for the brake wheel most commonly used is to have a square taper to the end of the shaft with sufficient round beyond it for a thread for a nut. If the wheel is well fitted to this taper and the nut properly screwed down with a slight upset of the thread to prevent nut turning back, I know of no better fastening. A key above the nut is too apt to catch in a man's coat sleeve.

The best upper brake shaft bearing is probably a malleable iron casting carrying all the parts and bolted with two horizontal bolts through the end plate, one vertical bolt through the roof framing and one good lag in the top of the end plate.

The best fastening for ladder rounds and handholds of whatever kind is most emphatically a through bolt with the nut on the outside and riveted over. It is the safest for trainmen and defects can easily be detected and remedied by inspectors.

A lag screw is apt to be a snare and a delusion. It cannot be inspected satisfactorily without being pulled, and then there is no certainty. Many of them have been driven home with a hammer and when loosened in the wood by decay or otherwise, they give no sign. Even when applied in the best possible manner they eventually become treacherous.

I want to say right here that in the building of new cars and the shopping of old ones, no handhold or ladder round should be applied with a lag screw where a through bolt can possibly be used, and our recommended practice should be so amended.

In my circular to the men who are in daily contact with the matter under discussion, I asked the question, "What could be done that would affect the most improvement in these parts?" The answer with surprising unanimity was: "Do away with lag screws and adopt standard ladder rounds, upper brake staff bracket and brake step with bolt fastenings."

Mr. H. F. Ball (Lake Shore & Michigan Southern)—I fully agree with what Mr. Bronner has said. About five years ago we issued instructions to our inspectors to examine grab handles, handholds and ladder rounds fastened with lag screws. They applied a pulling test, and the number of parts that gave out under this test was very surprising. It was necessary to do this on account of the number of trainmen who were being injured by reason of ladder irons and handholds giving out which were fastened with lag screws. In old cars we found that the threads on the lag screws were entirely eaten away and the lag screw was no better than the ordinary nail. We found what appeared to be lag screws that were simply big bolts driven in place of the old lag screws pulled out previously. We also found, as Mr. Bronner states, that some repairmen will put in lag screws through the sheathing only, without any backing behind the sheathing to hold the screw. On that account, it is absolutely necessary, in order to be sure that the grab handles and ladder irons are firmly secured, to give them a pulling test.

Mr. J. Hodge—Last year the Santa Fe put on ladders with 9-in. bolts. We use nothing else. Our instructions are when a car is on the track for repairs to remove the lag screws and secure the ladder with bolts. We find it necessary to do this. We found a number of cars with the lag screws in such condition you could pull them out with your fingers. The bolt is ½ x 9 in.

The Secretary read in abstract the report of the Committee on Supervision of Standards and Recommended Practice of the Association. Its recommendations were adopted.

Triple Valve Tests.

Mr. G. W. Rhodes.—The Triple Valve Committee reports that during the year it has had the plant of the Association transferred to the Purdue University, at La Fayette, Ind. The apparatus is now there and has been ready for operation since about Dec. 1. The Committee has made no tests of triples during the year; we have nothing further to report.

Mr. J. N. Barr—I do not feel very well satisfied with the report. I have been laid on the shelf for a couple of years, and probably I am not as well posted as I should be. I do know, however, that many roads have been asked to try the New York air brake. I was asked to do it. I advised my superiors that the M. C. B. Association had a committee and elaborate apparatus in the hands of experts, and that the Association had adopted certain standards as to what should make a good triple valve; that I had heard no report from this committee, and that at this meeting we would undoubtedly have a report on the New York air brake. Now, I simply find that the committee reports having transferred their apparatus to Purdue. That is all right, but we have not tried any triples. I would like further information on this subject, whether any attempts have been made to test this brake. I consider it an extremely important question. I think we all recognize that we cannot afford to put any apparatus under our cars that will not work with what we have; and we ought to know definitely whether it will work and how closely it will work. We have about 70 per cent. of our cars equipped with the Westinghouse air brake. The New York Air Brake Co. offers its brake for less money, and if it is as good as the Westinghouse we want it. I would like to know, however, with the New York air brake as prominent as it has been for the last two years, why no attempt has been made to get a test of it.

Mr. G. W. Rhodes.—At the last annual convention the following motion was offered by Mr. Mitchell: "I therefore make a motion that the standing committee on Triple Valve Tests this year obtain triple valves from the manufacturers and make tests of them and report the results of its tests to this convention next year, giving specific names and referring to catalogue numbers." The motion was adopted and the committee put itself in communication with the manufacturers of the New York air brake and endeavored to obtain triple valves from them for test. The President of the New York Air Brake Co. wrote back to the Chairman of the Triple Valve Committee saying that it would not furnish any triples for test. The reasons given were two, the principal reason being that owing to an opinion given by the late Mr. Massey, in 1898, following a conversation with the Chairman of the Committee, it objected to one of the requirements in test No. 2. The requirement reads as follows: "The final maximum pressure in this test must not be less than 15 per cent., nor more than 20 per cent., above the pressure given by the same brake in full service application." Mr. Massey, in a communication to me, told me that the New York air brake would not meet that requirement, and he wished the Committee to consider a modification of these rules. He acknowledged that it was a good feature in a triple valve, but did not consider it was a vital or essential feature, and wished the Committee to change it. On that score the New York Air Brake Co. objected to submitting its triples for test.

It made the further argument that it had a large number of triples in use, but that the present composition of the Committee on Triple Valve Tests is such that no member of the Committee had had any experience in the use of its triples, and that it did not think that its triples would get the attention or the care that they would if some of the members knew more about the advantages of this triple valve. I thought that both of these points were legitimate objections, and are points that this Association should give some attention to.

Mr. J. N. Barr.—In accordance with the suggestion of Mr. Rhodes, I would move that there be added to the present Committee two members who are familiar with the practical working of the New York air brake in actual service and in considerable quantities.

This motion was adopted.

Mr. J. N. Barr.—This is an extremely important matter, and the present status of the case leaves the Committee in a somewhat indefinite position. I therefore have the following motion to present, which I think fairly covers the ground: "That the Committee on Tests of Triple Valves be instructed to carefully consider the present recommended practice, with a view to determining if any modification is allowable; that they obtain sets of triple valves and make such tests, both on the rack and on trains, as may be necessary to give the Association full information as to the construction and operation of such valves. And that they be authorized by and with the consent of the Executive Committee to make the necessary expenditures from the funds of the Association; the expense not to exceed $5,000."

The motion was adopted.

The greater part of the second session was given to the consideration of the Rules of Interchange. Intentionally as few changes as possible were made in the present Rules; we omit the discussion of the Rules.

Should Additional Compensation be Paid for Car Repairs Done West of the 105th Meridian?

Mr. J. H. McConnell (Union Pacific).—I presume the absence of my name from this report has been observed. It is because I did not agree with the views of the other gentlemen of the Committee on this subject. There are a number of questions in this report that the Committee had viewed from a different standpoint, than did the members of this Association located West of the Missouri River. In the first place, in asking for additional compensation, we believe we are entitled to it from the fact that labor is higher, and all material is higher. The question has been brought up here about the large amount of foreign car mileage on the Western roads. That is something with which we have nothing to do. The Eastern cars are loaded through to points in the Western territory, and they return loaded and we cannot control that mileage. We have cars idle on our tracks, while these cars are going over our lines. This applies in a measure to refrigerator cars and private line cars belonging to the packing companies. The point is made that the rate per ton per mile is greater West of the Missouri River; but that question does not in any way affect the cost of car repairs, and I do not see why it should be brought up here. It is well known that we have heavy grades, bad water, and the train haul is not as great, the tonnage is less, and the cost for enginemen and firemen and all shop men is greater on all these points, which makes our cost excessive and more than it is East of the Missouri River. For these reasons we think there is justice in our claim, and it ought to be allowed.

Mr. J. Hickey (Rio Grande Western).—We find that it costs us 10 per cent. more for both labor and material than we are allowed by the M. C. B. rules. I do not think you can reasonably deny us an increased price.

Mr. W. S. Morris (Chesapeake & Ohio).—Our labor is considerably less than theirs, but they are getting higher freight rates, and that arbitrary rate was given them purposely on account of their condition. We must get the business for what we can, and as our earnings are far less, we have to operate correspondingly cheaper, which we do. I hardly see how this question can be settled unless the earnings of the road per ton mile shall be considered.

Mr. F. A. Delano (Chicago, Burlington & Quincy)—Ten or twenty years ago the arguments in favor of higher prices to the Western roads were much stronger than they are to-day. The transportation facilities of this country have increased to such an extent that we are one united country in every sense of the word; and we cannot recognize that there should be one price to govern us in one part of the country which does not govern another part, unless we come to the point of making a territorial division for all parts of the country. These conditions, which the gentlemen mention, apply with more or less force to every State in the Union.

The report was accepted, and the Committee discharged.

On Standard Wheel and Track Gages (to confer with the American Railway Association).

Mr. J. N. Barr.—I have communicated with the American Railway Association in the matter of track gages, and the question seems to be something of a dead letter. There have been certain figures adopted by the American Railway Association and the matter has been referred back to this Association without any idea of a further conference. In other words, we use figures which are satisfactory and have not been criticised, and there is no occasion to make any special change. Mr. Loree says in a letter that there is a proposition to make a test of a train of fifty cars on the Muskingum Valley Railroad, and he thinks that it would be quite an advantage to have that test made.

The report was accepted and the Committee discharged.

The reports of the Committees on Brake Shoe Tests and Trains Parting were received without discussion.

Square Bolt Heads and Nuts.

Mr. B. Haskell (Chicago & West Michigan).—I believe the work of this Committee should be continued, or another Committee appointed to take the matter up, with the American Society of Mechanical Engineers, and also with the American Society of Civil Engineers, and if possible get them to adopt this standard. If these Societies should adopt this bolt head as a standard, there would be a better chance to get the manufacturers to adopt it. A sketch of a bolt head, with a dotted line, and a full line, is presented. The dotted line represents the M. C. B. standard, and the full line represents the proposed standard. There is considerable metal taken out of the head. The heavy line is what we propose as the standard, and it is found, as can be seen by reference to Prof. Hatt's report, that it has ample strength to carry as heavy a load as will be put upon it.

Mr. J. N. Barr.—I presume the difference in strength is due to the effect of the greater distortion of the metal on account of the larger heads. In upsetting the heads the larger they are upset the more liability you incur of injuring the connection between the head and the bolt. I understand that the size of the head, as originally given, is the same size as the nuts, except as to depth. The dotted lines, as I understand, represent the Seller's standard. That was a matter of machine tool work, and I presume, so far as that is concerned, it is all right. It does not seem to me that there is much occasion for this Association to recommend the change, although I cannot see that the change is in any way objectionable.

Mr. B. Haskell.—I had occasion to take this matter up some years ago. We do not manufacture our bolts, and there are many other roads that do not. It was found that the manufacturers would not furnish a Seller's standard, without charging 10 per cent. increase. I could not consistently authorize that on our line, and as long as you had to purchase bolts, you could not get the Seller's standard. This state of affairs developed innumerable differences in sizes of bolts on cars, and each builder sems to have a standard of his own. At least 75 per cent. of the cars built in the country are not M. C. B. standard as to bolts. There is no official manufacturers' standard. Taking the matter up with the manufacturers, they all speak of the manufacturers' standard, but you can get no official figures. In comparing their figures, it was found that they vary, but not very much.

Mr. F. A. Delano.—I believe that the conclusions of this Committee are wise and proper, but it seems to me that what is called the Sellers standard, is known as the United States standard; this Association ought not to make a change until every prominent engineering organization in the country has also considered the matter, and all of us agreed on making the change. This matter of threads and sizes of bolt heads and nuts has got down to something like standards now, and we ought not to go independently to work and change what may be known as the United States standard, without other organizations agreeing to recommend the same thing. I move that the recommendations of this Committee be referred to the American Society of Civil Engineers and to the American Society of Mechanica Engineers, with a request that they look into the subject and if possible concur in our recommendations.

Carried.

Mr. J. N. Barr.—I move that the size of the heads as recommended by this Committee and which, as I understand it, is about what manufacturers furnish, be submitted to letter ballot as recommended practice for the M. C. B. Association. It does not matter what the other Associations may do in the case; I see no objection to it. It makes the matter more definite and gives us something to work on.

Carried.

Joint Meetings.

The President.—The question brought up at the first session in regard to the joint meetings of the M. C. B. and M. M. Associations was laid on the table until to-day.

The report of the Joint Committee is as follows:

A joint meeting of the sub-committees of the executive committees of the Master Car Builders' and Master Mechanics' Associations, consisting of Messrs. R. Quayle and J. H. McConnell, of the Master Mechanics' Association, and Messrs. C. A. Schroyer and G. W. Rhodes of the Master Car Builders' Association; was held on April 17, 1899. Mr. Schroyer was elected Chairman of the joint meeting.

The question referred to these committees by the executive committees as to how best to shorten the time required for holding the conventions of the two Associations was discussed fully, and it was decided that each sub-committee should report back to its respective executive committee as follows:

That the time of holding both conventions should be changed to the second Tuesday in June.

That a joint opening session of both Associations should be held at 10 o'clock A. M. of that day to hear the addresses, including the addresses of the Presidents of both Associations and the annual reports of the Treasurer and Secretary of the two Associations. After this is over—

The Master Mechanics' Association to have the time up to 1 P. M. Tuesday.

The Master Car Builders' Association to have Tuesday afternoon.

The Master Car Builders' Association to have all of Wednesday.

The Master Mechanics' Association to have Thursday A. M.

The Master Car Builders' Association to have Thursday P. M.

The Master Car Builders' Association to have Friday A. M.

The Master Mechanics' Association to have Friday P. M.

If any further time is required by either Association it can be available on Saturday, but it is not thought that this will be necessary.

The order of business of the joint meeting on Tuesday morning to be arranged jointly by the Presidents of the two Associations, and to be published in the programme of both conventions.

Mr. J. N. Barr.—I do not believe that we should take much time discussing this matter. We have talked it over for five years. There is a disposition on the part of a great many members to feel that the report of the Committee mixes things up. There is also a disposition, as I understand it, that the meetings of the two Associations should be held in one week, so that persons who want to attend them both should not be compelled to lie over Saturday and Sunday idle. I make a motion to amend the report of the Committee, so that the dovetailing feature of the report be taken away, and that one Association meet on Monday and complete its business during the first three days, with the hope that the other Association will adopt the last three days.

Mr. R. P. C. Sanderson (Norfolk & Western).—I think the motion should carry with it that the Interchange Rules should be taken up on Tuesday and not left until the last day.

Motion carried.

Mr. A. M. Waitt.—I move that the Executive Committe has authority to act in conjunction with the Master Mechanics' Association to make the necessary arrangements for the meetings next year. Carried.

Mr. J. H. McConnell.—I would ask leave at this time to introduce a resolution. I offer the following:

The officers and members of the Master Car Builders' Association regret that the business engagements of our Secretary, Mr. John W. Cloud, compel him to decline a re-election. Therefore be it

Resolved, That a vote of thanks be extended to Mr. Cloud for the faithful and efficient manner in which he has performed the duties of his office, and for the uniform kindness and consideration he has always given to the officers and members of the Association; and that in retiring from the office he has so long and ably filled he carries with him the goodwill and best wishes of the Association for his future success.

Resolved, That a copy of these resolutions be engrossed and presented to Mr. Cloud.

The reading of the resolutions was followed by loud applause and they were unanimously adopted by a rising vote.

Mr. J. W. Cloud.—It is hardly worth while for me to tell you how highly I appreciate this evidence of your consideration. But I would like to know what man could serve a body of men like this as secretary and not do his best. It has been a pleasure to me to try to do the best I could, and it is very gratifying not only to know that my efforts have been appreciated by my friends, as I consider you all, but it is deeply gratifying to have it thus expressed, and I thank you with all my heart. (Applause.)

M. C. B. Couplers; to Define Contour Lines more fully, when new and when worn, and Propose Specifications for Couplers.

This report, which was published in our last issue, was considered by sections.

Mr. R. P. C. Sanderson.—I move that recommendation (A) be adopted and submitted to letter ballot for adoption as a standard.

Mr. J. H. Barr.—As I understand Mr. Sanderson's motion, we are to adopt as a standard the length of the guard arm extended about 1 in. I would say before we vote on that that this will extend the guard arms at least 5/8 in. longer than any in present use. I do not see how you can avoid that. In adopting this recommendation, the Secretary of the Association should present a drawing showing not only this extension, but the radius of curvature of the point of the guard arm, fixing definitely the distance at the end of the guard arm. We cannot afford to have guard arms of different lengths. The breakage of guard arms is a most important point, and the relation between the face of the knuckle and the striking point of the guard arm, and the radius of the end of the guard arm, should be fixed definitely.

Mr. R. P. C. Sanderson.—I ask the Committee whether it considered the length of the straight guard arm in connection with twisted head couplers? How do the long guard arms on sharp curves affect the average twisted couplers?

Mr. W. W. Atterbury (Pennsylvania RR.).—There will be some little defect with the twisted heads, but your Committee in its investigations found the head so badly twisted on a great many couplers that we did not think that question should affect our recommendation in any way. The effect of the twist on the propsed contour is comparatively small. I understand that Mr. Barr would like to have us still further define the contour by going over the point. That is a very simple matter and the Committee will will be glad to do it.

Mr. J. N. Barr.—I move that the Committee be requested to complete the length of the guard arms as near as it can, to the general average of to-day and the radius of the curvature. Carried.

Mr. Sanderson's motion to submit the section to letter ballot for adoption as a standard was carried.

Mr. J. N. Barr.—I move that the recommendation in section (B) be submitted to letter ballot as a standard.

Mr. G. W. Rhodes.—The section, as presented by the Committee, is as follows: "It is recommended that the vertical dimension of knuckles be fixed at 9 in. as a minimum." By reference to appendix B I notice the Committee says: "The vertical dimen-

sions of the knuckles have been determined. It is assumed to be 9 in., but measurements show a minimum of 8½ in. It is obvious that any decrease of this dimension renders separation more liable, due to variation in the height of couplers." There is one feature of the knuckle question to which allusion has not been made, and I would like to have it considered even if we did not take any definite action about it. The knuckle breakages have been and are very frequent. We are all familiar with the upper lug breakages and the lower lug breakages, and we have all recognized that there is a considerable opening betwen the top lug and the bottom lug. If that opening could be diminished in any way it would add materially to the strength of the knuckle and would save knuckle breakages. Not long ago on our road we had fifty knuckles made with a 1½-in. opening in place of the 1⅞ to 2-in. openings, which generally prevail. We put them on the way cars of our trains, so that where pushing engines were used we would test the knuckles in the most unfavorable position. We got satisfactory results and found there was no difficulty in having the opening 1½-in, and it added materially to the strength of the knuckle. I would ask the Committee why they did not consider the opening between the top and lower lug and make some definite recommendation in defining the vertical length of the coupler?

Mr. W. W. Atterbury.—The committee did not feel warranted in making any recommendations in changing the knuckle at that point. Our experience let us to believe that the amount of opening is necessary in order to couple the M. C. B. drawbars with the general link and pin coupler as found on various foreign cars. The section was adopted.

Mr. A. M. Waitt.—I move that section (C) in which it is recommended that the vertical dimension of the end of the guard arm be fixed at 7½ in. as a minimum, be submitted to letter ballot as a standard. Carried.

Mr. A. M. Waitt.—When it comes to gages, I think the motion should be to submit them to letter ballot for recommended practice. There are possibilities of slight changes in recommended practice being necessary. It is wise not to adopt the gages the first year as standard. I make that as a motion, that section (D) be submitted to letter ballot as recommended practice. Carried.

Mr. J. N. Barr.—I move that section (E), in which it is recommended that the horizontal plane containing the axis of the shank of the coupler bisect the vertical dimensions of the knuckle and end of guard arm, be submitted to letter ballot as a standard of the Association.

Carried.

Mr. A. M. Waitt.—As section (F) does not seem to require adoption as recommended practice or standard, I move that the Association endorse the recommendation of the Committee that the gage for new knuckles be used on all knuckles purchased separately for renewals.

Adopted.

Mr. R. P. C. Sanderson.—I move that section (G), in which it is recommended that the vertical height of the stop shoulder or horn of coupler be not less than 3½ in., and that the horn be arranged to touch the striking plate before the back of the head of the coupler strikes the head of the draft timbers, be submitted to letter ballot as standard.

Adopted.

Mr. A. M. Waitt.—I move that section 2 be submitted to letter ballot for recommended practice. The section reads as follows: "To define the contour lines more fully when worn. This takes in the subject of gages for worn couplers, and it is recommended that the gage shown in Fig. 41 be used. These gages are cheaply made of sheet metal stampings, and it is earnestly recommended that they be immediately put into use at all interchange points, and that the same care be given to the examination of couplers as is given to any other portion of the car. We have no doubt the use of this gage will put a stop to a large percentage of the instances of trains parting on the road without couplers unlocking."

Carried.

Mr. A. E. Mitchell.—Will Mr. Atterbury give the use of this gage to the members of the Association?

Mr. W. W. Atterbury.—The question has been before the Committee, that the gage should be patented. It is the idea of the Committee that it was appointed to develop such a gage, and it believes it has done its work and the gage is the property of the Association in any event.

Mr. A. M. Waitt.—I move that we authorize the Secretary to arrange with some reputable manufacturer to furnish gages of this kind, and if an arrangement of this kind can be made, that a sample gage be submitted to the Committee for its approval as to its correctness in dimensions and style, and that the members of the Association be informed as to where they can obtain the gages and at what price.

Carried.

Mr. R. P. C. Sanderson.—I move that the specifications for couplers be submitted to letter ballot as recommended practice.

Carried.

Mr. G. W. Rhodes.—I move that the consideration of the dimensions of the shank be referred to the Committee which has presented this able report. I think it is most competent to take up that quastion. If there is any likelihood of a Standing Committee being appointed it would be proper to have the matter go to them. I move that the matter be referred to the present Committee, but if there is a Standing Committee appointed, that it be referred to that Committee.

Carried.

Mr. R. P. C. Sanderson.—I move that the recommendation of the Committee that the back corners of the yoke in the pocket attachment be changed from ¼-in. radius to ⅝-in. radius be submitted to letter ballot as a standard.

Carried.

Mr. G. W. Rhodes.—I move that the other point, that the play of the shank of the coupler, in the carry iron, be not less than ½-in. on each side, be submitted to letter ballot for standard.

Carried.

Mr. A. M. Waitt.—In line with the suggestion made by this Committee, I move that the Association appoint a committee on Coupler Tests, to consist of not less than five members, which shall from time to time test the best couplers. The Committee to certify to the Association those couplers that satisfactorily pass the requirements of the standards of the Association and the recommended tests. Furthermore, that this Committee be authorized to arange for the construction of standard machinery for testing couplers, the same to be paid for by the Association.

Mr. G. L. Potter (Pennsylvania Lines).—Does Mr. Waitt's motion contemplate that this Committee shall make a report through the Secretary, of every test it makes? Or shall the members through their managers write to the Committee? I recommend that the result of every test be given to the members through the Secretary. I would also amend Mr. Waitt's motion by making the Committee three instead of five members.

Mr. A. M. Waitt.—Mr. Potter's idea in regard to having the reports of each test sent to the members of the Association is the idea in my mind. I said five on the Committee because at time, where you have a small committee, there may be a little prejudice existing, and if you have five you reduce the liability of that. All our Standing Committees on Tests ought to be composed of five members at least.

Mr. Potter's amendment was put to a vote and lost, and the original motion of Mr. Waitt was carried.

Mr. R. P. C. Sanderson.—I move that the recommendation of the Committee that pivot pins should be of one uniform length and only two sizes be submitted to letter ballot for adoption as a standard.

The motion was carried.

Mr. F. A. Delano.—A good many couplers are bought on specifications, just as wheels are, and a question has arisen as to what is the best way of marking the couplers so that it will be known when they are applied and that the term guarantee can be absolutely fixed. I move that the Standing Committee be requested to suggest some way in which the couplers shall be marked. A mark somewhat similar to that put on air brake hose might be cast in the shank of a coupler and the figure chipped off showing just the day of month when the coupler was applied.

Carried.

Air Brake Appliances; to Propose Complete Standards, including Piping, with a view to reducing the joints to a minimum.

Mr. G. W. Rhodes.—It would seem as though these recommendations are important and some action should be taken on them by the Association in order that we may get the benefit of them. I move that sections 1 to 6, inclusive, be submitted to letter ballot for recommended practice.

Mr. R. P. C. Sanderson.—There is one thing in connection with the fifth section concerning the looseness of air brake cylinders on the bottoms of cars. My experience shows me that the greatest portion of that is due to the shrinkage of timber. I believe they should be secured by stout keys rabetted into the bottom of the sills to resist the end pressure of the brake cylinders.

The motion of Mr. Rhodes was carried.

Mr. G. W. Rhodes.—I move the adoption of section 7, amending it by substituting in place of "Westinghouse representatives" the words "air brake manufacturers." The motion was carried and the Committee continued.

Wheels and Axles; Specifications for Wheels and Axles for 60,000, 80,000 and 100,000-lb. Cars.

Mr. R. P. C. Sanderson.—I move that the specifications for 33 in. cast iron wheels submitted by the Committee be referred to letter ballot for recommended practice.

Carried.

Mr. G. W. Rhodes.—I move that the axle be submitted to letter ballot as standard.

Mr. R. P. C. Sanderson.—If we were simply designing a new axle and had nothing else to consider for a 100,000 lbs. car, I believe the design is first rate. But there is an economical side to this question which we must consider. It is more than likely that 100,000 lbs. cars will be a general car for hoppers and cars of that class, but the 80,000 lbs. car will be a very general car for a long time for interchange cars for stock, etc. The adoption of the 10-in. journal in 100,000 lbs. capacity axle, cuts out the use of that axle, after the wheels have been refitted a time or two under the 80,000 lbs. car. If the committee had recommended 5½x9-in. journal, I believe the 9-in. journal would have been long enough, and in refitting the wheels or turning down cut journals the axle would still be good for 800,000 lbs. capacity cars. There is money in that to railroad companies in the future, and I believe it would be better if the journal length were 9 in. It is said that you can upset the journals. I think the practice of upsetting the journals is detrimental, making the metal porous and spongy.

Mr. S. Higgins.—I think in building 100,000 lbs. capacity cars, which is to be the car of the future for hopper cars, we ought not to take any chances in getting the journals too small. Last year we made a thorough investigation in regard to 100,000 lbs. capacity cars, and we placed an order for one thousand. We found one road which now has a large number of these cars in service, and they originally arranged to have the cars built with journals 5½x 9 in. They have since found out that they made a mistake and they are changing their cars from that size to 5½x10 in. I think that is pretty good evidence that the committee's work is all right.

Mr. E. D. Nelson.—It might be well to say that the advantages Mr. Sanderson speaks of are, of course, perfectly clear, and the strength of the body of the axle between the wheels would be greater if the journals were made shorter, but the length of the journal is decided absolutely on the question of friction and lubrication, and the Committee did not think it should be made any less in length. The motion of Mr. Rhodes was then put and carried.

The specifications for steel and for iron axles were also adopted to be submitted to letter ballot as recommended practice. Also, the recommendation of the Committee as to numbering axles. The Committee was discharged.

Uniformity of Section for Car Sills; to Consider the Practicability of Adopting a Standard.

Mr. G. W. Rhodes.—I move the sizes recommended by the Committee be submitted to letter ballot as a standard.

Mr. W. Garstang.—I notice that the sizes are all even figures. I would ask the Committee if this would make any difference with the sawmill men. The first item is 4x8 in. The sawmill men would like it 4¼x8¼ in. It might make a difference in the machinery used in cutting this timber.

Mr. R. P. C. Sanderson.—In reference to the first diagram on the last page, I will say that 4x8 in. car sills are now used by 142,712 cars of 50,000 lbs. capacity. The Committee consulted with the saw mills in the South and the lumber dealers in the East, and had some correspondence with lumber men in Oregon, and they indicated that the special sizes were of no particular interest to them, that they could furnish any sizes. They all agreed to this, that if they could get more uniform sizes demanded they could furnish the lumber more promptly, but they did not say anything about the price; but we would get a better grade of lumber and they would furnish it more promptly when ordered.

Mr. J. N. Barr.—I would like in the proper place to extend this question to the sides and roofs of cars. I believe there is more need of uniformity there than there is in the use of sills.

Mr. R. P. C. Sanderson.—That suggestion was made to us by one of the Oregon lumber men and the Committe on Subjects has that as one of its recommendations. Mr. Rhodes' motion was carried.

The report of the Committee on the Height of Couplers was received and the Committee discharged. There was no discussion. It was decided to dispense with the remaining topical discussions as had been prepared in the Proceedings.

The following officers were elected for the ensuing year:

President, C. A. Schroyer.
First Vice-President, J. T. Chamberlain.
Second Vice-President, J. J. Hennessey.
Third Vice-President, W. J. Robertson.
Treasurer, G. W. Demarest.
Secretary, J. W. Taylor.

Members of the Executive Committee to fill vacancies caused by the expiration of the terms of three members: S. P. Bush, A. E. Mitchell and William Garstang.

Some Tunnel Projects.

Last week the New Jersey end of the Hudson River tunnel was bid in by Frederick B. Jennings, of the firm of Stetson, Jennings & Russell, for $300,000, and the New York end was bid for $100,000 by the same firm. It is the plan of the buyers to reorganize the old company and proceed with the work. About three-fourths of the distance across the river has been completed from Fifteenth street, Jersey City and from Morton street, New York, a few hundred feet has been finished. It is estimated that

$6,000,000 has been spent on the work, and that $3,000,000 additional will be required to complete the tunnel. Inasmuch as this work may possibly be taken up in the near future, a few notes on the history of this scheme may be of interest.

Work was begun in 1874, but was soon stopped until 1879 by an injunction of the Delaware, Lackwanna & Western R. R. On July 21, 1880, the first accident occurred, resulting in the death of twenty men. This delayed the work somewhat, but during the summer of the following year work was again progressing. On Aug. 20, 1882, the bulkhead on the New York end gave way, and ten days later a leak occurred on the New York side. All work was stopped, and not resumed until the spring of 1883, and when started again was soon discontinued, not to be taken up until 1887, one of the delays being on account of lack of funds. About April 1, 1887, the water was pumped out and work continued, but it was suspended in six months, the cause given again was lack of funds. The north end was then out less than 2,000 ft. In 1889 work was again undertaken and by the middle of March of the following year an iron shield had been put in place and work proceeded until the tunnel was about three-fourths completed and work was again stopped, and since then water has filled the completed portion. Mr. C. M. Jacobs, of Jacobs & Davies, consulting engineers, has been in London for some time in the interests of the tunnel company, and has expressed his confidence in the early completion of the work.

A history of the work is given in S. D. V. Burr's book on "Tunneling under the Hudson River," printed in 1885. Articles in the Railroad Gazette from 1889 are as follows: 1889, pages 559, 569 and 623; 1890, pages 7, 25, 36, 174, 189, 246, 662: 1891, page 38; 1892, pages 592 and 622; 1893, page 156.

A few facts noted in the Railroad Gazette articles.

Aug. 30, 1889, article giving details to date.
Jan. 6, 1890, review of work from May, 1889. At this time the tunnel was about three-quarters of a mile long, and iron is used for lining.
Jan. 17, 1890, reference by S. D. V. Burr to blowout on Jan. 4, 1890.
March 14, 1890 (illustrated), shield similar to Greathead shield, 19 ft. 11 in. in diameter, and worked by hydraulic pressure. In this issue are given the names of the engineers in charge of work.
Sept. 26, 1890, New York end of the work completed for 151 ft., New Jersey end for 2,270 ft., 220 ft. of which cast iron was used for lining.
Jan. 16, 1891, article by Mr. Charles H. Paine. At that time 2,800 ft. was completed, and work was being pushed at the rate of 6 ft. 8 in. a day.
Aug. 12, 1892, article including report of Mr. C. W. Buchholz.
Feb. 24, 1893, note giving the estimate to complete the work. This was given as $750,000.

The New York & Long Island Terminal Railway Co. was incorporated at Albany on June 20, with a capital stock of $7,500,000. The Directors of the company are George W. Young, Lewis Cass Ledyard, Richard A. McCurdy, James Simpson, Joseph S. Auerbach, Henry P. Booth, Charles D. Dickey and August Belmont, of New York; Charles M. Pratt, W. H. Baldwin, Jr., Eugene G. Blackford, Lowell M. Palmer, George D. Pratt and Frank L. Babbett, of Brooklyn. The road is to be three miles long and will start from Flatbush and Atlantic avenues, Brooklyn, thence under the East River to West Broadway, south of Fulton street, Manhattan. A map of route of tunnel, with many details, was shown in our issue of May 5 last, p. 310.

The Manhattan & Jersey City Railway Co. was incorporated on Friday last at Albany with a capital of $10,000 by E. C. Moore, New York; W. T. Lindsey, Huntington, L. I., and others, to build a tunnel under the Hudson River from New York City to Jersey City or Hoboken. The shares are $100 each. It is stated that Mr. Moore is the active mover in this plan, and he states that this tunnel will be made of concrete incased in boiler steel. The plans seem to be imperfectly and incompletely formed.

Several tunnel projects are under way in addition to those referred to above. One is the New York & Brooklyn Railway Co., of which Emerson McMillin is President, and which desires to build a tunnel under the East River, with terminals near City Hall in New York, and City Hall in Brooklyn. This company obtained a State charter at Albany in 1896, and is now seeking to secure from the Municipal Assembly certain consents which it deems it desirable to have, although in 1896 it obtained from the Mayor and Aldermen of New York the consents necessary at that time.

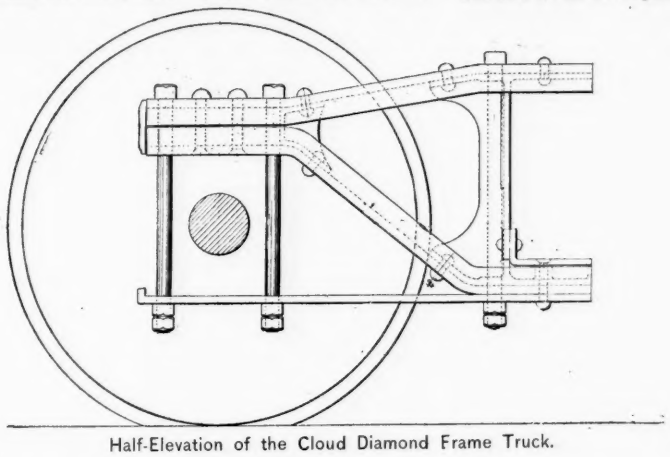
Other North River tunnels are being discussed. One is the North River tunnel referred to above. The second project is that of the Manhattan Railway Co., which was incorporated at Albany on May 17, with a nominal capital of $10,000. The tunnel line of this company is to be about one mile in length, and its terminus in this city is to be below Canal street, on the west side of the City.

A New Metal Truck.

At the Old Point Comfort Conventions the Cloud Steel Truck Co. exhibited a new diamond frame truck designed by Mr. John W. Cloud. It is stated that the new truck has been brought out to meet the views of those who prefer the arch-bar type to the pedestal type of freight truck, and at the same time to make a lighter and stronger side frame than is obtained in the usual bar construction. The side frame is really the new feature, as it can be used with any form of truck bolster or transom.

It will be seen from the accompanying engravings that the top and bottom arch bars are made of steel plates rolled or pressed into the form of channels. Commercial shapes are said to be objectionable for this purpose, as the large fillets in the corners prevent such channels being readily bent into the form required for arch-bars. The tie bar is of the usual form.

Between the ends of the arch-bars a malleable iron casting is fitted having a shoulder at the end against which the ends of the arch-bars butt; this casting is also extended as shown so as to strengthen the frame at the joints. These parts are held together by rivets in addition to the pedestal bolts, and are well secured against slipping. A single malleable iron casting takes the place of the usual column guides, and the bends in the arch-bars are strengthened in the same way as those near the pedestals. As the parts are riveted together the column bolts can be made smaller, 1⅛ in. bolts being used where 1⅝ in. bolts are commonly required.



Half-Elevation of the Cloud Diamond Frame Truck.

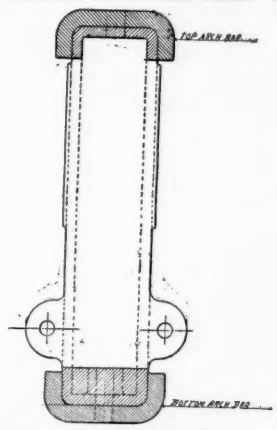
A test was recently made at the Armour Institute, Chicago, of a side frame of the Cloud design suited for 80,000-lbs. capacity cars, which withstood a load of 90,000 lbs. before the elastic limit was reached. An M. C. B. arch-bar frame for 80,000-lb. cars was tested in the same way, and showed an elastic limit of only 45,000 lbs.

Railroad Legislation in Missouri.

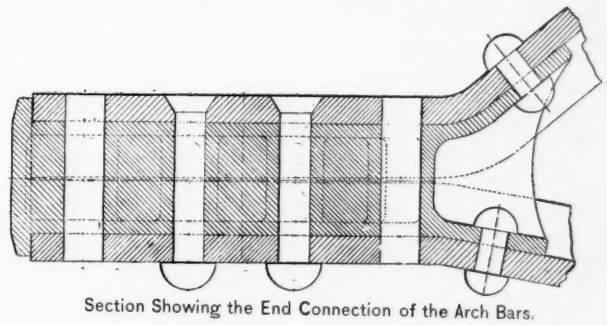
The Legislature of Missouri, recently adjourned, passed four laws affecting railroads. These laws are as follows:

An act requiring railroads after they have agreed with the owner of animals which have been killed or injured, as to the amount of damage, to settle such damage within 40 days. If this is not done, twice the agreed amount must be paid.

An act authorizing the railroad commissioners to order connecting tracks between two railroads which are within 100 ft. of each other. The commissioners must give the railroads a hearing and must order connections only under reasonable conditions; and they are to apportion the expense. Penalty for noncompliance $25 a day.



Section Through the Side Frame at the Center.



Section Showing the End Connection of the Arch Bars.

An act requiring railroads to have passenger trains connect at junctions. The railroad commissioners are to require connections where they can reasonably be made without serious detriment to the business of either road, and may prescribe time-tables. They are to settle differences arising between companies in relation to this matter, and on complaint of three citizens concerning any junction must institute an inquiry; penalty for noncompliance, $100 to $1,000 a day.

An act requiring corporations organized in other States to procure a license for doing business in Missouri. If it appear that a foreign company making application could not be organized under the laws of Missouri the license must be refused. The fee for a license is $10.

Street Railroad Law.

The law which attracted the most public attention was a revision of Chapter 155 of 1889, the street railroad law. This act, which was not approved by the Governor until last Monday, makes liberal provisions for building and consolidating street railroads. It is in substance as follows:

Sec. 1.—Existing street railroads, having acquired routes, may lay their track notwithstanding that the line may be within three streets of an existing road. Sec. 2 repeals the St. Louis street railroad act of 1860 so far as inconsistent with this. Sec. 3 is the same as Sec. 1, but applies to cable roads. Sec. 4 is similar to Sec. 2.

Sec. 5 authorizes street railroads to carry mails, but not so as to impede or delay passengers. Sec. 6 requires wires over railroads to be 22 ft. high and protected by guard wires. Sec. 7 requires a full stop of street cars, within 20 ft., before crossing a railroad.

Sec. 8 authorizes a bridge company owning a bridge connecting Missouri with an adjoining State to run a street railroad over such bridge; or it may lease to a street railroad the right to operate and may own the stock or guarantee the bonds of the street railroad company.

Sec. 9 provides for the conditional sale of street railroad property and for the retention of the lien by the seller until payment is completed. Sec. 10 requires contracts of sale, lease, etc., to be recorded by the Secretary of State.

Sec. 11 stipulates that contracts already in existence may be recorded. Sec. 12 invalidates Sections 5178, 5180 and 5181 R. S. as applying to these contracts. Sec. 13.—Five or more persons may form a company and own and run a street railroad for the conveyance of persons, mail and express parcels. When 50 per cent. of the stock is subscribed and 10 per cent. is paid in the articles of association shall be filed with the Secretary of State and the association becomes a body politic and corporate.

Sec. 14.—Such corporations may build and run a railroad on any street or road after getting consent of municipal authorities of cities or towns, or of the county court of a county, which consent is to be given only after petition has been made by owners of half the property fronting on the street or road. The railroad may be operated by cable, electric or other motive power consented to by the local authorities. The rate of fare must be consented to by the local authorities. The company may acquire a right of way over private property 50 ft. wide; may issue bonds and mortgage its property and franchises; may purchase, lease or acquire other street railroad companies on a two-thirds vote of the stockholders; and may sell, lease or dispose of its property or rights to another street railroad company on a two-thirds vote of stockholders. Sec. 15.—Existing companies may take advantage of this law by formally accepting its provisions and paying the prescribed fees.

Sec. 16 allows increase of capital stock or bonds by majority vote of stockholders. Sec. 17 allows the issue of preferred stock by a majority vote of the stockholders.

The law takes effect at once.

Foreign Railroad Notes

European newspapers report that Colonel Thys, who built the Congo Railroad, with some of his engineers, have sailed for the Philippines to prospect for railroads to be built for a Belgian syndicate.

Last March a new railroad between Linares and Atmeria (Spain) was opened, which claims to have the highest railroad bridge in the world. It spans a canyon in which the mountain stream Salador runs, has three spans of 343 ft. each and is 360 ft. above the level of the stream.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The Chronicle's report of gross and net earnings for the month of April shows an increase of 5.46 per cent. in gross and 7.73 in net. The comparison is made with a very prosperous year, the gain in April, a year ago, having been 14.36 per cent. in gross and 18.68 in net. The April increase in gross earnings was largest on the Pennsylvania (entire system), amounting to almost half a million dollars. The Milwaukee & St. Paul came next with about one-third of a million, and then the Lehigh Valley, the Southern Pacific, the Canadian Pacific and the Central of New Jersey with about one-quarter of a million each. The greatest increase in net for the month of April was on the Atchison, which amounted to a little over one-third of a million dollars. Then followed the Pennsylvania, the Canadian Pacific, the Southern Pacific, the Reading, the St. Louis Southwestern, the Louisville & Nashville and the Central of New Jersey in the order named. These include the only roads showing net gains of over $100,000, as compared with the year before.

We printed last week, page 428, some extracts from a Century Magazine article by Mr. Josiah Flynt on the relations of the railroads to the tramp. That article is an account of Mr. Flynt's personal investigation as a tramp expert into the work of Mr. Loree's police on a part of the Lines West of Pittsburg. It was discovered that the tramps had learned to systematically avoid this particular railroad. Mr. Flynt himself traveled as a tramp in this investigation, and all of his comrades spoke of this as the hardest railroad in the United States for a tramp to beat. But Mr. Flynt discovered further that this police force was doing great work in freeing the communities through which the railroad passes from tramps and beggars. The plan is to keep up a constant watch on the trains and the tramps are taken off one by one, day after day. The courts and jails are not crowded and the taxpayers do not feel the burden of taking care of these vagabonds. Mr. Flynt was further impressed with the fact that this police force is on friendly relations with the municipal and village police along the road and that it has the respect of the communities formerly at the mercy of the tramps. He is now convinced that if the tramps can be kept off from the railroads their trade will become unattractive, and he is conivnced that they can be kept off by such measures as have been taken on the railroad which he investigated. Of course, we knew a good deal of all this before. Something of it was told in Mr. Loree's address before a meeting of the Railway Claim Agents, printed in our issue of Oct. 14, '898, page 739. There we find the further gratifying fact that this efficient police service is carried on with fewer men and at lower cost than the inefficient service which preceded it. The saving in men amounted to almost 30 per cent. and the saving in money to over 23 per cent. When we say the saving in money we mean the saving in the cost of the police service alone. The indirect saving in thefts, damages and many other ways could hardly be estimated.

One important matter brought about at the Master Car Builders' Convention was the enlargement of the Committee on Triple Valve Tests and the provision for carrying out certain tests. The committee reported the removal of the apparatus belonging to the Association to Purdue University and that it had made no tests during the year. Mr. Barr asked for further information as to why no tests had been made. He rightly judged that if a comparatively untried apparatus is offered "we ought to know definitely whether it will work and how closely it will work." Mr. Rhodes, Chairman of the Committee, explained that the New York Air Brake Company declined to submit any triple valves for the tests for two reasons. The first of these was that one of the requirements of test No. 2 could not be met by the New York triple. Mr. Massey, lately engineer to the New York Air Brake Co., and the designer of most of the apparatus, acknowledged that this requirement provided for a good feature in the triple valve, but a feature which is not vital or essential, and it was his opinion that the committee ought to modify the requirements. This requirement is under the emergency application test and it is that "the final maximum pressure in this test must not be less than 15 per cent., nor more than 20 per cent. above the pressure given by the same brake in full service application." It is not for us now to discuss the importance of this requirement; we are merely stating the fact presented as one reason why the New York valve was not submitted for the tests of the committee. The other reason, as stated by Mr. Rhodes, was that the committee had no member experienced in the use of the New York triples and the company did not think that its apparatus would get proper attention or care. It would be apparent that as a business matter the New York Air Brake Company would have made a mistake in submitting triple valves for tests under those conditions. The upshot of the discussion at Old Point Comfort was to enlarge the committee by the addition of two members familiar with the practical working of the New York air brake in actual service and in considerable quantities, and to instruct the committee to ascertain if any modification in the requirements is allowable and to go ahead and make tests on the rack and on trains with authority to spend $5,000 for this purpose. The matter has come to be a serious one. As a great number of freight cars is fitted with air brakes, the dangers of interchange of cars fitted with triple valves that do not work together have become apparent to a good many railroad men. As time goes on they are liable to become apparent to others than the mechanical officers immediately concerned.

Among the valuable reports at Old Point Comfort was one from the committee appointed to investigate the best methods of preventing trouble in boilers from water impurities. The recommendations of this committee are included among the abstracts of reports to the Master Mechanics' Association, printed elsewhere in this issue. The paper itself is somewhat long and covers in detail the conclusions which are given in the form of recommendations from the committee. The troubles experienced suggest the necessity of taking even greater precautions against impurities in some localities and further of investigating more completely the troubles on a larger number of roads. Out of 23 answering the circular regarding the injury to boilers from impure waters only six have not been troubled. The principal ailments of boilers come from the accumulation of mud or scale on the parts forming the heating surface, thus preventing a free transmission of heat to the water and also clogging the space around the firebox and between the flues. One of the important statements made in the report is included in the third recommendation, which says, in substance, that the cost of purifying waters will always be small when compared with the use of waters which cause trouble in the boiler. A careful examination of the report, however, makes it plain that economy in this work depends on the character of the water and the method and the reagents used. In many instances it is cheaper to purify the water by lime and soda (which are regarded as the cheapest of the effective and harmless reagents for this work) in the tender than to purify it before it is allowed to leave the supply tank. It may be well to note that by using water in certain purifiers, one road gives the cost for 1,000 miles of engine mileage as low as 14½ cents, while others give higher cost, the highest being $3.50. On the other hand, the cost for boiler washing for a number of roads does not show as much variation, the average for 14 roads reporting being 72 cents for each thousand miles. This alone may be sufficient to indicate that where one method of purifying would be economy, the same practice on another road would be much more expensive than by following one of the other suggested remedies referred in the paper. In the third recommendation it is said that water purification by evaporation represents, on the ground of cost alone, the most effective practice of the day. The cost by this method will vary in proportion to the cost of labor and fuel. For mechanical filters the committee recommends that water used for this purpose should not exceed five per cent. of the amount pumped and the time consumed in cleaning should be from 15 to 20 minutes every five to ten hours. In place of either of the above methods it is well to note the recommendation of the committee in effect that an engine fitted wih blow-off cocks, as illustrated elsewhere in this issue, is fully equipped with a good purifier. This subject will be referred to more in detail in connection with the discussion at the convention.

The Ton-Mile or the Engine-Mile.

The report of the Master Mechanics' Committee on the ton-mile basis for motive power statistics is largely the work of Mr. Quereau. A sentence near the beginning of this document says: "The following argument . . . made by Mr. Quereau, of this committee, clearly illustrates, etc." The argument then begins with quotation marks, but the end of it is not indicated in any way; therefore, we do not know precisely where Mr. Quereau's work ends. Probably, however, the Secretary will see that this is made clear in the final revision prepared for the complete volume of the Transactions. Certain phraseology indicates that Mr. Quereau's work is practically the whole report. However that may be, his argument for the ton-mile as against the engine-mile is remarkably neat and conclusive.

The first proposition is that it is unwise to try to compare motive power statistics on different divisions of the same road, or to compare one road with another; but that useful comparisons may be made on the same division or system as between different years. The conclusion of the committee is that it is unwise to attempt to secure a uniform basis with a view to making the records of all railroads comparable. This proposition is sustained by argument and examples, and in the main we must accept it as sound.

Yet if a system of statistics is adopted which is in itself accurate, and if the methods of keeping the records are made known to the student of them, and if the principal and controlling physical conditions of each road are made known, it ought not to be impossible to make useful comparisons even without the labor of accurately reducing the work done on grades to an equivalent amount of work done on the level. The main thing in a comparison between two different roads would be to make the statistics accurate on each road, to make the system of keeping records uniform on these different roads and to make known to the investigator the conditions as to grades and curvature, engine weights, train weights, average speeds, etc. This would enable a student of the records to fudge a comparison which while not really accurate, would still be of some use and would give at least an approximate notion of the relative economy of doing the work on the roads compared.

But the committee assumes, safely and properly, as we judge, that accurate statistics are necessary for the successful operation of the motive power department and that a great deal of good can be got out of comparing the work done on any one piece of road by different men and in different years. Obviously, such comparisons are worse than useless if the records are incorrect, and for that reason we have long ceased to take much interest in the locomotive performance sheets that come to us from the different railroads, and in the statistics of locomotive performance which are constantly published in the annual reports of the railroads.

In the report of the President of the Southern Pacific Company in 1897 attention is called to an important point in practice in keeping the record of the work of locomotives. In that year the ton-miles per train-mile are given, based on the actual revenue train mileage; that is, the mileage of locomotives in trains carrying regular train crews, this being usual practice among railroad companies. But before that time it had been the custom on the

Pacific system to include the mileage of light and helping locomotives in computing the average tons per train. A large mileage of engines helping trains and going light over the road, is made on that system, and this had been included in the records, for the purpose of controlling and minimizing as much as possible this mileage. In order to conform to the general practice of other railroads the record was changed in 1897 to cover mileage of locomotives carrying train crews. We mention this example as showing how dangerous it is to compare the figures in annual reports, unless we know the method of making up the records.

By way of showing the difference in the conclusions to be drawn from engine-miles and ton-miles Mr. Quereau gives an example from actual records. On one road the average miles per engine increased in 1898 over 1897 0.3 per cent. The ton-miles per engine increased 24 per cent. Obviously, any conclusion drawn from the engine-miles alone would be misleading. Again, taking the item of fuel. On one division taking the miles run per ton of coal the enginemen on one engine division did 22 per cent. better than those on another engine division adjoining, but taking the coal burnt per 100 ton-miles they did only three per cent. better. Again, comparing a level division with a mountain branch, and using engine-miles per ton of coal, the mountain branch is only 12 per cent. worse off than the level division, but using the basis of coal burnt per ton-mile the mountain branch is 227 per cent. worse off. Or, comparing passenger engine service and freight engine service over the same division and using engine-miles, the freight enginemen burnt 68 per cent. more coal, but using ton-miles the passenger men burnt 32 per cent. more coal; or, in other words, there is a difference of 100 per cent. between the alleged facts drawn from the two different methods of comparison. The same sort of analysis is applied to the items of repairs and wages, with similar results; that is, it is shown beyond doubt that conclusions drawn from engine-miles are misleading. The engine-mile basis presents arguments for light loading and inefficient work. The ton-mile basis encourages efficiency and economy.

The usual argument against a radical change to accurate methods of keeping account of locomotive performance is that it will cost too much to keep such records; to which it might be answered that any cost is too dear for records that deceive. The committee presents a scheme which would keep the records by divisions; dividing the service of freight, passenger, switch and work locomotives; showing the ton-miles done by each, the engine-miles run by each, the coal and supplies consumed and the cost, subdivided under repairs, enginemen, roundhouse men, fuel, lubricating, water supply and stores. The design is to give cost per ton-mile by the freight engines and per engine-mile by the passenger and switch and work engines. This record would also give the average ascents and descents of all grades per mile of road and the percentage of branch lines to the total road mileage. These two items will permit of a rough comparison such as we suggested early in this article, although the committee admits that it would be impracticable to equate the conditions accurately.

Altogether, the report pretty much destroys any remaining confidence in the engine-mile as a working basis of comparison and suggests what seems to be a possible and a sufficiently accurate plan for comparing these important records.

A press despatch from Montreal, June 18, says that the strike of the trackmen on the Grand Trunk has been settled. The road is to take back all the men who apply and is to discuss with a committee of employees the demand for an increase of wages. A later press despatch from Toronto gives to Sir Wilfrid Laurier the credit for settling the strike, the terms being an increase of 15 cents a day in wages, ten hours to be a day's work, all overtime and Sunday work to be paid for at an increased rate, and all strikers to be re-employed, except those guilty of illegal acts, such cases to be decided by the courts. The "labor" element in politics seems to have been a prominent factor in this controversy, and there have been long debates in Parliament over it. The despatch referred to continues:

"The government sent an inspector over the road, and on his report took action. The government has several proposals before it for the assistance of Grand Trunk schemes, so that it was not very difficult to put pressure on the management. The strik has lasted about one month, and involved more than 2,000 men. The opposition members of Parliament tried to settle the dispute a week ago, but made a bungle of the affair, and now the government scores heavily, owing to the general sympathy with the strikers, whose wages previously were less than $1 per day. It is understood that Mr. Hays personally favored the settlement."

The Canadian Pacific has shortened the time of its through passenger trains, No. 1 and No. 2, between the Atlantic coast and the Pacific one whole day, reducing the running time from Montreal to Vancouver, 2,906 miles, to 100 hours. The former time was 124½ hours, or 121½ hours apparent time, the difference in time between the two cities being three hours. The passenger leaving Montreal at 11 A. M. on Monday has heretofore reached Vancouver at 12:30 (noon) on Saturday, making the trip in 121½ hours, apparent time. Reducing this to 97 hours apparent time (100 hours actual), he will get there at noon on Friday. The trains will run through every day in the week in both directions; heretofore there have been only six trips each way weekly east of Winnipeg. British Columbia newspapers say that the new schedule is better than anything accomplished by any other transcontinental line. In a sense, this is true, as the best time made between New York and San Francisco is 102 hours, 15 minutes, or 99 hours 15 minutes apparent time. The distance is, however, nearly 400 miles greater; if comparison were made from Montreal to San Francisco (using the Grand Trunk to Chicago) the time would be 8½ hours longer than from New York.

The entertainments provided for the mechanical conventions were elaborate, and while the money expenditure was more than last year, the total will amount to only about one-half that of the 1897 meetings, held at Old Point Comfort. It was to be expected that the sum spent this year for entertainments would be greater than last year, because there are more ways in which money can be spent at Old Point Comfort than at Saratoga; but the committees were well managed and much credit is due to the chairmen of the various committees, not only for what they could do to keep down expenses, but for the amount of time and labor spent. The entertainments consisted of band and orchestra concerts, dancing (every evening), an exhibition of fireworks, a cake walk and the M. C. B. and M. M. balls. Transportation was provided in the form of carriages and boats and tickets over the electric roads and boat lines to Newport News, Norfolk and Portsmouth.

New Railroad Building for the First Six Months of 1899.

Notwithstanding the increased activities in the railroad field this year, the total mileage of actual building completed proves somewhat disappointing. The preliminary figures for the first six months ending June 30, give a total of 1,181.45 miles. Undoubtedly later returns will add somewhat to this total. As it stands it shows an advance of some 90 miles over the preliminary figures of last year, and yet there is every reason to believe that the new railroad building in actual progress is much more extensive than was that of a year ago. An example in point is the Chicago & Northwestern, which is building 110 miles in Minnesota, 10 miles in Wisconsin, and 127 miles in Iowa, making a total of 247 miles now building. Yet of this only a little over four miles is actually completed.

The figures as received show that Pennsylvania takes the lead for the six months with a total mileage of 106. Then follow Mississippi, 85; Arkansas, 83; Oklahoma, 76; Louisiana, 62; Ohio, 61; Florida, 60; Utah, 53; and South Carolina, 50 miles. Only 37 States and Territories of the total number have any building at all reported, and there are six States in which building is reported for less than five miles each. The railroad which takes the lead in mileage completed is the Illinois Central, which with its new lines in Mississippi and other States, has a total of 64 miles. Then follow the Choctaw, Oklahoma & Gulf, 51 miles; the Chicago, Rock Island & Pacific, 49; the Buffalo, Rochester & Pittsburgh, 48; and the Utah & Pacific, 32 miles. It is certainly early to predict the total mileage to be built for the year, but if the proportion of last year's building for the first six months holds good as compared with this year, we may expect considerable increase over the new mileage of last year, which reached nearly 3,300 miles. The figures by States are as follows:

NEW RAILROAD BUILDING BY STATES.

States.	Companies.	Mileage.	States.	Companies.	Mileage.
Alabama	7	14.25	Nebraska	1	1.
Arizona	2	23.7	New Mexico	1	23.07
Arkansas	4	83.	New York	1	6.5
California	4	45.9	North Carolina	5	30.14
Colorado	2	3.	Ohio	4	61.
Connecticut	1	6.5	Oklahoma	3	76.
Florida	6	60.5	Oregon	2	25.
Georgia	5	48.6	Pennsylvania	14	105.92
Idaho	3	40.	South Carolina	2	50.2
Indiana	1	7.	Tennessee	2	7.
Indian Territory	3	43.	Texas	2	25.
Iowa	2	14.51	Utah	3	52.96
Kansas	2	4.	Vermont	1	2.
Louisiana	4	62.	Virginia	2	1.75
Maryland	2	19.	Washington	1	13.
Michigan	1	4.	West Virginia	3	10.5
Minnesota	2	13.	Wisconsin	1	14.
Mississippi	4	85			
Missouri	5	41.2	37 States and Territories	110	1,181.45
Montana	1	2.			

Railroad Legislation in Minnesota.

The Legislature of Minnesota, recently adjourned, passed ten laws affecting railroads.

Chapter 39 provides that after this year the three State Railroad Commissioners shall be elected, instead of being appointed, as at present. The term is to be four years.

Chapter 78 requires railroads whose tracks are less than 4 ft. 8½ in. gage to change to the standard within such reasonable time as the Railroad Commission may fix. The Commission must within one year examine all narrow gage roads, then issue an order saying when the change shall be made. They must take into consideration the amount and probable life of the rolling stock, and all other facts bearing on the reasonableness of the time to be allowed.

Chapter 99 makes it unlawful for any person other than passengers or employees to get on or off moving cars, engines, street cars, etc.

Chapter 100 requires that after a railroad company has once put in effect, and maintained for 60 days, any rate for the transportation of grain, flax, lumber, coal or live stock, it shall not advance the rate without an order from the Railroad Commission. The law applies to joint rates as well as those over a single line. Penalty for non-compliance, $100 a day.

Chapter 170 requires the issue to drovers of passes both ways when cattle are shipped, one pass for the first car and one for each additional four cars. Failure to comply makes the railroad liable to the shipper for damages, with reasonable attorney's fees.

Chapter 222 requires railroads, on the order of the railroad commissioners, to build platforms at any station or side track to facilitate loading grain, live stock and other commodities. The commissioners must give the road 60 days' notice. Penalty for non-compliance, $25 a day.

Chapter 225 requires commission merchants selling agricultural products to give a bond to the State Railroad Commissioners, in such sum as the commissioners may fix, for the benefit of the persons intrusting goods to such merchants.

Chapter 229 amends section 2714 of the general statutes of 1894. Any railroad may acquire another road which can be lawfully connected to it, so as to make one continuous main line, but shall not consolidate with a parallel or competing railroad. The question whether a road is competing shall be decided by jury.

Chapter 311 empowers the owner of live stock who suffers damages by negligence of a carrier, where the stock is carried over two or more roads, to join any two or more of such roads as defendants in an action to recover damages; and the court or jury shall determine which road was at fault.

Chapter 314 requires railroads which carry passengers in cabooses to furnish every such caboose with a toilet room for the accommodation of passengers. Cabooses must be furnished for emigrants. Penalty for non-compliance, $100 a day.

Railroad Legislation in Texas.

The legislature of Texas, recently adjourned, passed eleven general laws affecting railroads, as follows:

The Senate bill, giving the railroad commission power, when deemed necessary, to prevent interstate rate wars and injury to the interests of the people or railroads of Texas, or in case of any other emergency, to be judged of by the commission, to temporarily alter or suspend any existing freight rates. Effective Aug. 26.

A bill permitting railroad corporations to acquire new right of way for the purpose of shortening the line or reducing the grades. Effective Aug. 26.

A bill permitting corporations having the right of eminent domain to enter upon and take possession of property sought to be condemned pending litigation, upon the payment or security. Effective Aug. 26.

The Senate bill to require railroads to receive all freights coming to them from steamboats and other vessels, without discriminating for or against any other steamboat line, etc. Effective Aug. 26. This bill is a sequel to the Lone Star-Mallory fight.

The Senate bill authorizing the lease of any railroad connecting at the State line, not exceding 30 miles in length, by any railroad company, so connecting. The leased line must be operated under the jurisdiction of the Texas Railroad Commission. Effective Aug. 26.

Senate bill making it unlawful for any railroad company to charge or collect on freight more than is specified in the bill of lading. Became effective March 29.

Senate bill compelling railroad companies, where application for cars is made by a shipper, to have cars at the point designated in the application within three days if the application is for ten cars or less; within six days if the application calls for more than ten and less than fifty, and ten full days if the application be for fifty cars or more. Effective Aug. 26.

Senate bill authorizing corporations now or hereafter incorporated for the purpose of owning union

passenger depots to condemn land. Effective Aug. 26.

An amendment to the law requiring railroads to keep and maintain in the State at the place where their general offices are located, certain officers. This bill provides that where the principal shops of any company are situated on its line in the State at a place other than where its general offices are located, the Superintendent of Motive Power and Machinery, Master Mechanic, either or both, may have his office at such place where such principal shops are located; and the railroad commission, where it is made to appear that any officer other than general officers of any company can more conveniently perform his duties by residing at some place on the line in Texas other than the place where the general offices are situated, may authorize any such officer to so reside and keep his office at such place. Effective Aug. 26.

Senate bill fixing venue in suits against two or more railroad companies for damages resulting from the transportation of freight, baggage or other property, by providing that suits may be brought against any one or all of such roads in any county in which either of such roads extend or is operated. Effective Aug. 26.

Senate bill making the giving of rebates a felony. Effective Aug. 26.

Prominent in railroad matters dealt with by the Texas Legislature this year was that of the partial consolidation of a number of important lines, affecting the Southern Pacific, the Missouri, Kansas & Texas, the St. Louis Southwestern and the Gulf, Beaumont & Kansas City. Most of these roads were prepared to build extensions into territory which needs new railroads, but declined to proceed except on condition that certain branches and controlled lines should be consolidated with the parent company. As the fundamental theory which prevails among Texas people concerning the treatment of railroads is to take them by the throat and to hold them continuously under water except for a few minutes now and then that they may catch their breath, these consolidation propositions were looked upon by many members of the Legislature with terrified suspicion; but at length by some means or other a majority was secured and the bills were passed, but only to be vetoed by the Governor. The movement, however, was not abandoned and the bills at length became laws. It is stated that the immediate result will be the beginning of work on nearly all these new lines. Most of these bills have been already noted in our news columns, but are here brought together for convenience. The legislative bills are as follows:

Senate bill authorizing the Texas & New Orleans Ry. Co. to purchase, own and operate the following roads: Sabine & East Texas, the Texas Trunk and the Louisiana Western Extension. This act shall be null and void if the Texas & New Orleans does not build a line connecting the Sabine & East Texas with the Texas Trunk road and requires the work to be completed within four years and without bonuses.

House bill authorizing the Houston & Texas Central Ry. Co. to purchase, own and operate the Austin & Northwestern, the Central Texas & Northwestern, the Fort Worth & New Orleans, the Lancaster Tap and the Granite Mountain & Marble Falls. It requires the H. & T. C. Ry. Co. to extend its line from Burnet on the Austin & Northwestern to Lampasas within two years. Effective Aug. 26.

Senate bill authorizing the Gulf, Beaumont & Kansas City Ry. Co. to purchase, own and operate the Gulf, Beaumont & Great Northern Ry. Co. and to issue bonds and secure the same by mortgages upon the property so acquired under orders of the railroad commission of Texas. It enables the said corporation, the Gulf, Beaumont & Great Northern Ry. Co., to construct its proposed line of railway as provided in its charter, and for said purposes to raise money through the issuance of stock and bonds under the direction of the railroad commission. Effective Aug. 26.

Senate bill authorizing the St. Louis Southwestern Ry. Co., of Texas, to purchase, own and operate the road known as the Tyler Southeastern, extending from Tyler, in Smith County, to Lufkin, in Angelina County. Effective Aug. 26.

Senate bill authorizing the Southern Kansas Ry. Co., of Texas, to purchase, own and operate the road known as the Pan Handle railway, extending from Pan Handle City to Washburn. Effective Aug. 26.

Senate bill authorizing the Missouri, Kansas & Texas Ry. Co., of Texas, to purchase, own and operate the Sherman, Shreveport & Southern, with the proviso that the latter road be extended to the Louisiana State line and the first-named road extended into the city of San Antonio.

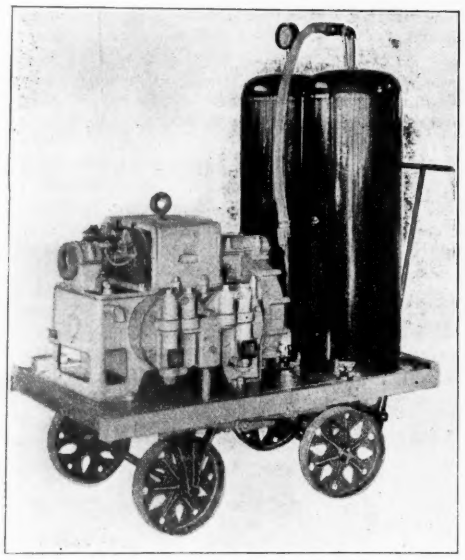
Senate bill authorizing the Houston, East & West Texas Railroad Company to lease and operate the Houston & Shreveport, beginning at the northeastern terminus of the first-mentioned road at Logansport, La., and running to Shreveport, La. Effective Aug. 26.

Portable Air Compressing Apparatus.

The Christensen Engineering Company of Milwaukee, Wisconsin, has recently put a compact compressing apparatus on the market, to be used where electric current is available, for such work as cleaning car cushions and driving pneumatic tools. This apparatus is being used in connection with riveting the structural iron work on the new Post Office building in Chicago.

The apparatus herewith illustrated weighs about 1,400 lbs., is portable and self-contained. The air compressor has a capacity of 50 cu. ft. of free air per minute and is of the same style and pattern as the company is putting on the market for air brake work. These are made in all sizes, ranging from 10 cu. ft. to 300 cu. ft. free air a minute.

The air compressor is self-contained and all the working parts run in a bath of oil, the motor being arranged on the top of and connected to the compressor crank shaft by a gear and pinion of special design, introduced by the Christensen Engineering Company. This gear and pinion is made up of sections of a true helix, which makes their working practically noiseless, and is said to increase their durability fully 25 per cent. over that of the ordinary straight faced spur gear and pinion.



The Christensen Portable Compressor.

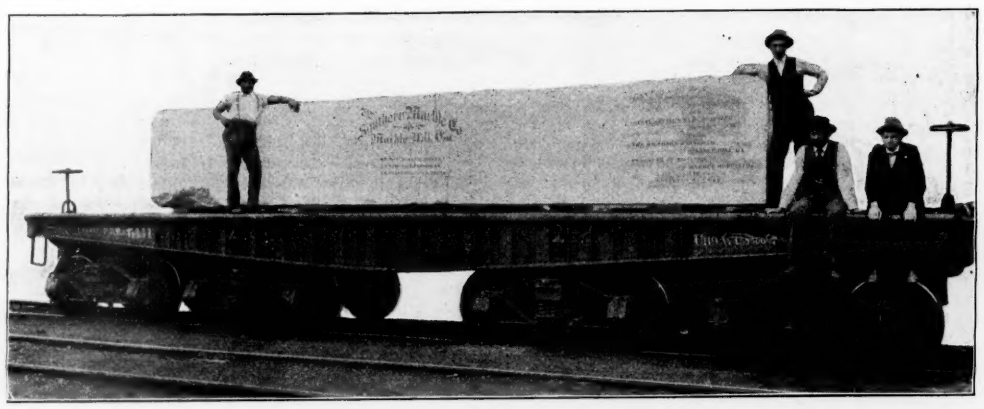
The compressor delivers air into the reservoirs, from which a hose connection is taken, and the compressed air carried by it to the point where it is to do the work. The action of the compressor is controlled by means of an automatic governor, which works by means of the air pressure accumulated in the reservoirs in such a way that the motor stops whenever the pressure is at a maximum or is at minimum, with any desired variation between the two extremes. The compressor is not provided with a water jacket, as experience has shown it to be unnecessary.

The box which enclosed the motor compressor (not shown in the accompanying half-tone), together with the electric apparatus in connection with same, is all water tight and is so arranged that access is readily had to all of the various parts of the apparatus by simply opening doors arranged in the box for that purpose.

A 50-Ton Car Load in One Piece.

The accompanying engraving shows a piece of marble weighing 100,066 lbs. which was shipped on April 29 from Marble Hill, Ga., on the Atlanta, Knoxville & Northern Railway. This is probably the largest single piece of marble ever moved by any railroad in this country. It was 27 ft. 2 in. long, 4 ft. 4 in. wide and 4 ft. 3 in. high, and contained 500 cubic ft., 4 cu. in. This marble was quarried by the Southern Marble Company and was sent to Providence, R. I., to be used in the construction of the state capitol. The special car was one belonging to the Pennsylvania Railroad, one of two 4-truck cars, ordinarily designated as "gun cars." This car is built of iron is 39 ft. long, and weighs 53,700 lbs., which, added to the weight of the marble, gave a gross weight of 153,766 lbs. The shipment was sent over the Atlanta, Knoxville & Northern and the Western & Atlantic to Atlanta; and from Atlanta over the Southern Railway, the Pennsylvania and the New York, New Haven & Hartford. The marble was raised at the quarry by a Lidgerwood hoist and it reached its destination without any trouble. Previous to this the largest single shipment of the kind that we recall was one sent from Barre, Vt. That shipment weighed 26 tons and was peculiar in that it had to be placed edge upward and had to be let through the floor of the car to get it under the bridges. This was described in the Railroad Gazette of April 14, page 268. A second monolith has since been shipped over the A., K. & N., weighing approximately 50 tons, and several blocks of equal size will follow.

The fact that this Georgia marble is being shipped such a long distance excites some curiosity. The shippers say that this is due to its excellent quality. The marble is known as crystalline marble and absorbs practically no water. It is not affected by weather or climate and perpetually retains its brilliancy. One thousand carloads of this marble has been used in the construction of the state capitol at Providence, and it has also been used in building the Corcoran Art Gallery at Washington, the state capitol at St. Paul and St. Luke's Hospital, New York. Notwithstanding its hardness, this marble is, with pneumatic tools, carved to the most delicate designs.



A Fifty-Ton Monolith of Georgia Marble.

New Passenger Locomotive for the French State Railroads.

The French State Railroads have recently purchased of an English builder some new single expansion passenger locomotives which are similar in the arrangement of the wheels and cylinders to our eight-wheel type. They have a peculiarity, however, of some other French engines in that a prow is fixed at the front end and also the front of the cab is pointed, the object being to reduce the air resistance. Plate frames, a deep Belpaire copper firebox between the driving axles, and Serve steel boiler tubes are other features. Piston valves are used and the valve gear is of the Walschaert type. A variable exhaust nozzle, on a level with the top of the smokebox, is arranged so as to be under the control of the engineman, and there is also a damper placed at the top of the stack; equalizers are not used. The following are the principal dimensions, which have been reduced from metric measurements:

Gage	4 ft. 9 in.
Cylinders	17.3x25.6 in.
Driving wheels, diam.	80 in.
Boiler pressure, per sq. in.	200 lbs.
Total weight in working order, lbs.	110,600 lbs.
Heating surface, fire box	119.5 sq. ft.
Heating surface, tubes	1,582 sq. ft.
Heating surface, total	1,701.5 sq. ft.
Boiler, diameter at front	54 in.
Length of tubes (Serve)	11 ft. 9in.
Number of tubes	111
Outside diameter of tubes	2½ in.
Center of boiler above rail	7 ft. 5⅝ in.
Top of stack above rail	14 ft. 5 in.
Width over all	9 ft. 10⅞ in.

TECHNICAL.

Manufacturing and Business.

The Armstrong Manufacturing Company of Bridgeport, Conn., has found that another addition will be necessary. This is the second increase since January 1st. Much new machinery is now being added to the works and the company has built a large fire-proof warehouse, to which the shipping department has been transferred. The company reports an increase of 30 per cent. in export business within the past few months and that $125,000 worth of pipe threading machines have been exported to Germany since January 1st.

The Converse Bridge Co., at Ridgedale, near Chattanooga, Tenn., has lately increased its force as a result of increased orders.

Alfred C. Torbert and Frederick A. Peckham have formed a partnership, under the firm name of Torbert & Peckham, for the purpose of carrying on a business at 1603 Monadnock Block, Chicago, Ill., as general purchasing, manufacturers' and selling agents for general contractors' and railroad plants of every description; mining and general machinery, supplies, etc., both new and second-hand. Mr. Torbert has had many years of experience in the engineering and contracting field and has been for the

past eight years the general purchasing agent for McArthur Bros. Co., of Chicago. Mr. Peckham has had considerable experience in this line, and has for the past eleven years been connected with the regular staff of the Engineering News, of New York, being for three years in the editorial department and for several years the Manager of the Western branch, with headquarters at Chicago.

The M. S. Friede Co., of New York, has shipped considerable material for the Chinese Eastern consisting of shovels, bought from the Wyoming Shovel Works, Wyoming, Pa.; pumps from the Goulds Mfg. Co., Seneca Falls, N. Y.; sledges, hammers, etc., from Topping Bros.

The Peckham Motor Truck and Wheel Co., of New York, has shipped a complete machine shop tool equipment to the Oeawara Electric Railway Co., of Japan.

The State Department at Washington has received a communication from United States Minister Bryan, at Rio de Janeiro, to the effect that the Brazilian Government has advertised for bids for 30 miles of street rails, all bids to be in by Aug. 12.

At the recent stockholders' meeting, E. H. Jones was elected President and Manager, and Fred Smith Treasurer of the Vulcan Iron Works, Wilkes-Barre, Pa.

The foundry of the Milwaukee Bridge and Iron Works, at Milwaukee, Wis., was damaged by fire to the extent of $20,000 on June 8.

Iron and Steel.

Reade & Bowler, Cleveland, O., have sold the entire plant of the Elmira Iron and Steel Rolling Mill Co., Elmira, N. Y., to C. R. Baird & Co., of Philadelphia, who intend to operate the mill. The plant consists of open hearth steel furnaces, universal plate mill, five trains rolls, puddling furnaces, etc.

In the Chancery Chambers at Camden, N. J., the Vice-Chancellor has granted a temporary injunction against the payment of any dividends on the common stock of the Federal Steel Co. until the further order of the Court, and has ordered the company to show cause in the Court of Chancery at Camden, on July 3, why a permanent injunction should not be issued restraining absolutely the payment of any and all dividends on the common stock until after the close of the present fiscal year. The bill was filed by the attorneys for Walter R. Kern, one of the holders of preferred stock. In the bill it is stated that the charter of the company provides that the holders of preferred stock shall be entitled to receive non-cumulative dividends at the rate of, but not exceeding, 6 per cent. per annum, for the fiscal year beginning Jan. 1, 1899, and that this dividend must be paid in preference to any dividend on the common stock during this year.

Robert P. Linderman has been elected President, E. M. McIlvain Vice-President and R. W. Davenport General Superintendent of the Bethlehem Iron Co.

Charles G. Phillips has been appointed General Superintendent of the Diamond State Steel Co., at Wilmington, Del.

New Stations and Shops.

It is stated that the Chicago, Burlington & Quincy will let a contract within a few days for a new freight station, to be built in Kansas City.

Interlocking.

The Union Switch & Signal Co. has put in an interlocking plant for the Canada Atlantic, the Canadian Pacific and the New York & Ottawa at the crossing of the three roads near Ottawa. The machine has 30 levers.

Inspection of Street Car Equipments.

Mr. Albert B. Herrick addressed the Franklin Institute in March last on the subject of electrical inspection of street car equipments. Mr. Herrick has a novel way of pointing out the defects in the apparatus, assuming the place of a doctor and diagnosing the troubles met with in more than a thousand equipments examined. The lecture, published in the May issue of the Journal of the Franklin Institute, while discussing mainly the means by which the diseases in street railway apparatus are detected and located, refers also to careless inspection and careless maintenance of equipment. Our space permits a reprint only of his closing sentences:

Briefly summing up my experience of the testing of over 1,000 equipments, including nearly all the types extant, I find that the principal weak points are:

(1) That the two way connectors are responsible for a great deal more than their share of trouble, and that every break in the continuity of the conductor system reduces the reliability of the equipment for continuous operation.

(2) That a motor is not any better than its field.

(3) That careless brush inspection is responsible for more burnt-out armatures than those caused by poor motormen.

(4) That the maintenance of an equipment is much more economical and satisfactory than trusting to Providence and awaiting the time until it breaks down; in other words, it is far better for a street railroad manager to operate a sanitarium for his equipments rather than a hospital.

The vitality of an equipment rests entirely upon the excellency of its insulation; and the trend of recent improvements in the equipment is to abandon those insulators, which in time either oxidize or carbonize and become conductors.

One final pointer I would like to mention in regard to high-potential alternating insulation tests for railroad apparatus, which is generally considered a satisfactory method because it shows so many faults not indicated by other tests, but the application of this high-potential method, with depleted insulation, usually develops the fault which it detects and curtails the natural life of armatures and fields.

New Form of the Hancock Composite Inspirator.

In our issue of Jan. 24, p. 64, was illustrated the new Hancock composite inspirator having one steam, one overflow and one delivery connection, but independent feed or suction connections. This was essentially two ordinary inspirators combined in one body, the object being to make a more convenient arrangement for use where it is desired to put both injectors on one side of the locomotive or on the boiler head. As some roads prefer to have two delivery pipes, one on each side of the boiler, a new form of the composite has just been brought out which differs only in that each inspirator of the combination has a separate delivery pipe. These inspirators can be worked separately or both together as before, and are made in 23 different sizes. The capacity of the smallest one, for narrow gage and mine locomotives, is from a minimum of 185 gallons to a maximum of 740 gals. of water per hour, with 125 lbs. steam pressure. For heavy freight engines corresponding figures are 1,849 gals. to 7,698 gals. at the same steam pressure, and from 2,034 to 8,468 gals. with 210 lbs. pressure. Intermediate sizes have capacities between the limits named.

Officers of the M. C. B. Association.

The following are the officers elected by the M. C. B. Association to serve during the ensuing year: President, C. A. Schroyer, Chicago & Northwestern; First Vice-President, J. T. Chamberlain, Boston & Maine; Second Vice-President, J. J. Hennessey, Chicago, Milwaukee & St. Paul; Third Vice-President, W. J. Robertson, Central Vermont; Treasurer, G. W. Demarest, Northern Central; Members of the Executive Committee, S. P. Bush, Pennsylvania Lines, A. E. Mitchell, Erie RR., and William Garstang, Cleveland, Cincinnati, Chicago & St. Louis. The three members of the Executive Committee whose terms of office expire June, 1900, are: E. D. Bronner, Michigan Central; J. H. McConnell, Union Pacific, and William Apps, Canadian Pacific. Mr. J. W. Taylor, formerly Mr. Cloud's assistant, was selected by the Executive Committee as Secretary of the Association.

Electricity for Atchison Shops.

Westinghouse, Church, Kerr & Company have received a large and comprehensive contract from the Atchison, Topeka & Santa Fe RR. for an electrical equipment at the Fort Madison shops, Fort Madison, Iowa. Westinghouse, Church, Kerr & Co. have designed the installation, which includes lighting the shops and the railroad yards, providing electrical current for operating the turn tables for locomotives and for furnishing power in the machine shops and other purposes. In the central power house will be installed a Westinghouse steam engine of 60 h. p., to be direct connected to a Westinghouse 28 k.w. generator. Another generator of 34 k.w. will be belted to the present line of shafting. From the central power house conductors will be carried to all parts for the arc and incandescent lighting and to work special turn table motors and transfer table motors.

Mare Island Dry Dock.

Dennis Jordan, of San Francisco, was the lowest bidder for the dry dock at Mare Island, Cal., his estimate being $697,579. Other San Francisco bidders were: Healey, Tibbitts & Co., $809,120; California Bridge & Construction Co., $937,376; Campbell & Pettus, $769,898.

THE SCRAP HEAP.

Notes.

The day express on the Pittsburgh & Lake Erie from Pittsburgh to Buffalo now runs through in 7 hours 25 minutes, which is 1 hour 25 minutes less than heretofore.

The Pennsylvania is now running a train through between Washington and Atlantic City by way of the Delaware River bridge, above Philadelphia, no stop being made at Philadelphia. The train is called the Capital Express, and it goes south in the morning and north in the afternoon. The time through is 4 hours 20 minutes; distance about 206 miles.

The Grand Jury at Reading, Pa., June 18, after considering for a whole day the evidence against Orrell, Wildemuth, Mogee and Rourke, charged with responsibility for the collision at Exeter, May 12, decided to find no bill against any one of the accused, and they were all discharged from custody.

Passenger train No. 1 of the Kansas City, Pittsburgh & Gulf, was stopped by robbers near Poteau, I. T., on the evening of June 15, and it is said that about $2,500 was taken from the express car, the mail car and the passengers. The safe was blown open with dynamite.

The Northern Pacific has taken off one of its two transcontinental passenger trains. The second train was put on a few months ago, but experience shows that the volume of travel is not sufficient to justify more than one through train daily each way.

Incorporation of the Stickney Freight Transfer.

The project for a great freight yard and station in the southwestern part of Chicago, which was started about 10 years ago, is again brought to notice by the announcement that the Chicago Transfer and Clearing Co., of Chicago, has been incorporated at Dover, Del., with a capital of $4,000,000. Activity in real estate recently in the neighborhood of the Stickney tract has led property owners to the belief that H. H. Porter, Chairman of the Eastern Illinois, and Eastern capitalists have again taken up the Stickney project and expect to put it upon a working basis. For some time there have been three different companies holding land and having large interests in the vicinity of the Stickney tract. They are the Union Transfer Railway Co., which was formed some years ago for the purpose of carrying out the freight clearing house plan; the Stickney Warehouse Co., formed by the St. Paul men who originally bought the land, and the National Stock Yards Co. It is thought that Mr. Porter and his friends will combine all these companies in one strong concern.

The Consolidation of Bridge Builders.

It is said that negotiations are still in progress for the consolidation of bridge building interests of the United States, and that the new company, when formed, will be capitalized at $50,000,000. Harriman & Co., New York, will have charge of the underwriting. Their appraisers are now examining the various properties.

New East River Bridge Board,

The new East River Bridge Commission has reorganized for the year by re-electing all the officers except Mr. Smith E. Lane, as follows: President, Lewis Nixon; Vice-President, James W. Boyle; Secretary, James D. Bell; Treasurer, Julian D. Fairchild. James D. Bell, who was elected in Mr. Lane's place, is a new Commissioner, recently appointed to succeed the late Thomas S. Moore.

Automobiles in Chicago.

It is announced that the organization of the Illinois Electric Vehicle & Transportation Co. is now practically completed, and that Mr. Samuel Insull has been formally elected President. The stock issue will be $20,000,000, but it is said that no public subscription list will be opened. One-half the stock will be taken in Chicago, the other half being divided between New York, Philadelphia and Boston.

At a meeting of the South Park Commissioners of Chicago on June 14, an order was passed prohibiting "all vehicles propelled by electricity or otherwise than by horses from traveling on the boulevards and parks of the South Side system." This order affects many automobiles used as delivery wagons by business houses as well as large numbers used on the boulevards for pleasure.

Conduit Electric Line in Chicago.

It is probable that the Chicago Union Traction Co., which has recently leased the North and West Chicago Street Rys., will ask the city authorities for permission to use the underground trolley for its lines in the downtown district, including the cable loops in the business district, and to substitute the overhead trolley for the cable lines north and west of the Chicago River. The proposition is to operate an underground trolley downtown for three years, and if it proves a success to change all the cable lines to that system. If it is not a success, at the end of three years the company will ask the right to operate its cars in the downtown district by the overhead trolley.

Chicago Drainage Canal.

A preliminary inspection trip was made on June 13 by the Illinois State Commissioners appointed to inspect the work. The Commission was accompanied by Mr. Desmond Fitz Gerald, its consulting engineer, and by the trustees of the Sanitary District of Chicago and its Chief Engineer, Mr. Isham Randolph. The party left Chicago at 8 A. M. in a special train over the Atchison, Topeka & Santa Fe., which ran to Joliet without stop, and on the way back stopped at all important points along the channel, reaching Chicago at 4 P. M.

Negotiations for the renting of the water power of the canal by the Diamond Match Co., as noted in our issue of last week, are progressing, and it is said that a tentative proposition is under discussion based on a maximum capacity of 20,000-horse power, which the company offers to lease for 50 years at $5 per horse power per year, one-half the amount to be paid direct to the Sanitary District and the other half to go into a sinking fund to defray interest charges on the amount invested.

New Ferry Boat at Boston.

The Boston, Revere Beach & Lynn has just put on a new ferryboat, the Dartmouth, to run between the terminus of its railroad at East Boston and the Atlantic avenue station in Boston. The boat was built by William McKie. It is 142 ft. 6 in. long and 47 ft. wide.

New Industries in Mexico.

According to the Journal of Commerce, a company with a capital stock of $100,000 has been formed to build a rolling mill, machine shop and car works in the vicinity of Monterey, Mex. Two New York merchants are said to be interested in the enterprise.

Delay in Filling Export Orders.

The Buenos Ayres Southern Railway Company's extensions are requiring considerable material. Through the inability of the contractors to secure early deliveries from this country the bulk of the orders have been sent to England. Constant efforts have been made to place some of the contracts here. It is feared that unless manufacturers treat the demands from Argentina with more consideration a great deal of business will be lost. The result of this indifference may not be felt for two or three months, but six months hence, after the old orders have been shipped and, possibly, when the domestic boom is over, manufacturers will realize their error. It will then be too late to secure immediate business, and the merchants must begin their task anew in order to obtain contracts for next year.—Journal of Commerce.

An Electric Transfer Table.

The Chicago City Ry. thoroughly overhauls its rolling stock every year, which entails handling each car several times in its progress through the shops. Formerly cars were pushed about by laborers, but since electricity was installed on so many of its lines the increase in number and weight of cars has made their handling a problem, as several thousand cars go through all departments of the shops at least once every year. During the past year mechanics transfer tables have been tried and Mr. Charles F. Moore, Master Mechanic of the company, has designed a

large electric transfer table, which is now in service, and which is capable of carrying the largest and heaviest cars used by the road. The electric equipment is placed at the front of the table, which is supported by a four-wheel truck of peculiar construction, the two front wheels being smaller than the rear wheels. There is also a raised platform at the front of the table on which the motorman stands. Immediately back of the truck is the transfer table, having rails on which cars are run, the cars being hauled sideways when the table is in motion. Back of the rails for the cars are two more wheels supporting the table proper. Cars are run directly on to the table from the tracks on the floor, the iron bridging between the front and back axles being depressed so that it barely clears the floor. A No. 3 Westinghouse motor of 25 h. p. capacity is suspended from the front axle in the usual way. Two overhead wires are used, and a special trolley with two prongs and wheels makes connection with the wires by which current is taken from the regular railway circuit. Two rheostats are connected in series with the motor, and a third of two panels, is connected in shunt with the field to cut down the speed. At the left of the platform is a G. E. controller, and back of it a lever which controls a clutch, by means of which the motor may be made to propel the transfer table or operate a drum on which is wound a rope used to haul cars on the track. It is a simple and efficient arrangement and has proved very successful. The track upon which the transfer table runs extends through the center of the second floor of the repair shop and on both sides of the track are other tracks at right angles and at regular intervals, upon which cars are shifted for inspection and repairs. Cars are taken up to the second floor on the electric elevator, run on to the transfer table and shifted to the department where repair work is to be begun.—Western Electrician.

B. & O. Passenger Engine Runs.

The Baltimore & Ohio is now running many of its passenger engines about twice as many miles monthly as formerly. There were some doubts about the practicability of long runs over the steep grades of the mountain divisions, but the change has been perfectly successful. Passenger engines are now run from Cumberland to Parkersburg, 207 miles; from Cumberland to Benwood, 201 miles, and from Cumberland to Benwood, 200 miles. This change has enabled the road to reduce the number of engines in that service from 24 to 12, and has doubled the mileage of each engine. Each locomotive will average about 7,500 miles a month.

West of the Ohio River three engines are used to haul trains 7, 8, 46 and 47 between Benwood and Chicago Junction, 190 miles, and they average about 7,680 miles a month. These engines are double crewed. Four engines at present are running trains 103, 104, 105 and 106 between Benwood and Cincinnati, a distance of 254 miles. These engines are also double crewed and they average monthly 7,650 miles. Similar changes have been made between Newark and Sandusky, between Newark and Shawnee, between Columbus and Sandusky and between Cambridge and Cincinnati.

It is estimated that under the new method the enginemen make about the same wages with less work. West of the Ohio River it now takes 13 locomotives to handle the trains, where formerly 25 were required.

Lake Notes.

The freight boat Manila, recently launched from the yards of the Chicago Shipbuilding Co., is a steel tow barge, with schooner rig, and was built for the Minnesota Steamship Co. under the supervision of Mr. Robert Curr, of Cleveland. She is 450 ft. long over all, 436 ft. on the keel, 50 ft. beam, and 28 ft. 6 in. deep, and will carry over 5,000 tons of freight. She has a single deck, built for bulk freight only, and 15 cargo hatches. There are two collision bulkheads and a double bottom, 4½ ft. deep, from stem to stern. The boat was launched sideways.

Another large steel schooner, recently launched, and built for the Bessemer Steamship Co., is the James Smeaton, which is 458 ft. long, 50 ft. beam and 25 ft. deep, with a gross tonnage of 5,049 tons. She has a capacity of 123 gross tons larger than the steamer Samuel F. B. Morse, of the same line.

It is announced that the American Shipbuilding Co. will abolish local offices and drafting rooms at the various yards and concentrate all the designing work in a central office with one force of marine architects and designers. It is said this change will save a large amount of money.

The Lake Carriers' Association has advanced the rate for unloading grain at Buffalo to 3 cents per 1,000 bu. to pay the expenses of the recent strike and to pay for private lighting in the Soo River. No boats will be admitted to membership in the Association after July 15.

In response to many inquiries a circular letter has been issued from the Branch Hydrographic Office at Chicago advocating the use of oil on the lakes in stormy weather. The letter says that thick and heavy oils are best and animal and vegetable oils are better than mineral oils. Suggestions for mixing certain oils that are useful with other kinds that are not useful are made, and careful directions are given for the using of the oils. It is said that the inquiry has been so great for these directions that it is expected within a short time that most lake vessels will be equipped with oil bags.

Electric Railroad Notes.

The stockholders of the Akron, Bedford & Cleveland RR. Co. will meet on July 3, to consider a plan for the consolidation of that company into the Akron Traction & Electric Co.

A reorganization of the Cleveland & Chagrin Falls Ry. Co. has been perfected and officers elected: President, F. M. Stearns; Vice-President, M. G. Waterson; Secretary, A. G. Hutchinson; Treasurer, C. E. Morganthaler. It is proposed to extend the road from Chagrin Falls to Garrettsville, making the road 40 miles long when completed.

The Paterson Central Electric RR. was sold to representatives of Garrett A. Hobart and Wm. Barbour, said to be members of a syndicate to consolidate the electric railroads in the northern part of New Jersey. This property has been in the hands of Mr. Barbour as Receiver since January, 1898.

J. C. Tarkington, General Manager of the Indianapolis & Martinsville Traction Co. (218 North Meridian St., Indianapolis), informs us that he will receive proposals for building and equipping the proposed 30 miles of electric railroad.

The Brooklyn Rapid Transit Company in a statement of its financial position shows that the authorized capital is $45,000,000. The single-track mileage of the entire system on May 20 is shown as follows:

Steam road now rebuilding as electric railroads: Brooklyn Union Elevated, 41.89 miles; Prospect Park & Coney Island, 17.34; New York & Coney Island, 2.41; Prospect Park & South Brooklyn, 1.15; to steam, 62.79; Cable: Brooklyn Heights, 1.27; Electric (overhead). Brooklyn City, 204.77; Brooklyn, Queens County & Suburban, 45.03; Nassau Electric, 129.70; Brooklyn & Brighton Beach, 17.86; Sea View, 2.20; Coney Island & Gravesend, 6.43; Sea Beach, 12.23; total electric, 418.22; total mileage, 482.28.

The B. R. T. also owns the following securities:

Entire capital stock of Brooklyn Heights, par value	$200,000.00
Equity in 999-year lease of Brooklyn City to the Brooklyn Heights	
Construction account of B. H. against B. C. for extensions and improvements on leased lines, amounting, March 31, to	4,673,759.57
Entire capital stock of Brooklyn, Queens Co. & Suburban, par value	2,000,000.00
Entire capital stock Sea Beach, par value	650,000.00
Entire capital stock Sea View, par value	190,752.54
First mortgage 6% bonds Sea View, par value	52,500.00
84,997.10 shares out of 85,000 shares of the common stock of the Nassau Electric, par value	8,499,716.00
60,520 shares out of 65,000 shares of the 4% cumulative preferred stock of N. E.	6,052,000.00
34,713 shares out of 38,301.60 shares of the 5% non-cumulative preferred stock of the Brooklyn Union Elevated, par value	3,471,300.00
109,974 shares out of 129,267 shares of the common stock of the B. U. E., par value	10,997,400.00
Entire capital stock of Coney Island & Gravesend outstanding, par value	35,400.00
*First mortgage 5% bonds of B., Q. C. & S., par value	2,000,000.00
*First mortgage 5% bonds of B. C., par value.	1,627,000.00
Total par values	$40,449,828.11

* Composing guarantee fund for performance of B. C. RR. Co.'s lease.

The proceeds of the additional issue of B. R. T. stock will be used for the acquisition of the Brooklyn & Brighton Beach, its reconstruction as an electric railroad, for the reconstruction as electric railroads of the Prospect Park & Coney Island, the New York & Coney Island and the Prospect Park & South Brooklyn (agreements to lease which is for 999 years have been signed) and for other construction purposes. The total annual interest charge of the company is $1,802,730, and the net fixed charges $3,166,730.

The property of the Prospect Park & Coney Island RR. Co. was turned over to the B. R. T. at midnight June 17. Ira A. McCormack has had his jurisdiction as General Superintendent, and J. C. Brackinridge as Chief Engineer, extended over this line. The sole competitor of the B. R. T. for the traffic to Coney Island is the Coney Island & Brooklyn Co.

Technical Schools.

University of Michigan.—The past year is said to have been an unusually prosperous one, the total attendance being 3,059 exclusive of the Summer School. The graduating class numbered about 700, of which 51 were from the engineering departments.

University of Minnesota.—Over 2,900 students have been on the University rolls this year and the number of graduates in all departments was 340, of which 190 were in the professional and technical schools.

University of California.—San Francisco dispatches announce that the Board of Regents has selected Prof. Benjamin Ide Wheeler of Cornell University as President of the University of California, to succeed Dr. Martin Kellogg, resigned. The salary of the President was fixed at $10,000 a year.

University of Wisconsin.—The number of students attending the University this year was 1,923, this being 156 more than in any previous year. The graduating class numbered 285. The Legislature appropriated $151,000 for the University, of which $100,000 will be expended for a new building for the College of Engineering and $16,000 for a new water tower. The new library building to be used in common by the University library and the State historical library, is nearing completion and when finished will give access to 200,000 volumes and 100,000 pamphlets. It is located on the University grounds and $620,000 was appropriated for its erection.

University of Ohio.—The Commencement exercises were held in the University Chapel on June 14, and the graduating class numbered 99. The address was made by Prof. J. Willis Gleed, of Topeka, Kan., his subject being "Real Life."

Purdue University.—The graduating class this year numbered 157 members and was the largest in the history of the University. It is said that 84 per cent. of the graduates were assured of good positions on leaving college. Several new rooms are to be added to Science Hall, and the equipment in all departments will be increased.

University of Illinois.—The twenty-eighth annual commencement was held at Military Hall on Wednesday, June 14, about 1,000 alumni and invited guests being present. The address was delivered by Hon. George E. Adams, of Chicago. His subject was "The Twentieth Century American." The graduating class of 109 members was the largest which ever left the University, and of this number 47 graduated in the various engineering colleges. This number includes only those graduating at the University proper and does not include the classes graduated from the allied schools in Chicago. The total attendance at the University proper this year was 1,824. In the graduate schools 16 master's degrees were conferred. At a meeting of the Board of Trustees a location for one large and three small buildings for the Agricultural College was agreed upon and several new members of the Faculty were selected, among the latter being William S. Aldrich, now of the University of West Virginia, who was appointed Professor of Electrical Engineering. It is announced that Mr. Edward C. Schmidt, who has been an instructor in the department of Mechanical Engineering during the past year, will have charge of the new department of Railway Engineering which is being organized, and which will be under the direct supervision of Prof. L. P. Breckinridge, head of the department of Mechanical Engineering. Mr. Schmidt is a graduate of Stevens Institute of Technology, and had several years' practical engineering experience before going to the University of Illinois in 1898.

Stevens Institute of Technology.—At the alumni meeting held on Wednesday evening last further details than were given in our last issue were made public regarding the plans for the buildings which will be erected as soon as the plans can be perfected. The $50,000 appropriated by Mr. Carnegie will be used in building the Carnegie Engineering Laboratory, and the $40,000 of the alumni fund, the larger part of which has been contributed by President Morton, will be used for a building containing President Morton's name, probably to be known as the Morton Building of Chemistry.

LOCOMOTIVE BUILDING.

It is reported, but not officially, that the Canadian Pacific has ordered 6 locomotives from the Kingston Locomotive Works.

CAR BUILDING.

The Georgia Car & Mfg. Co. is building 40 cars for the Southern Cotton Oil Co.

The Chicago, Burlington & Quincy is in the market for about 12 passenger coaches.

Pullman's Palace Car Co. has an order for two coaches for the Bavaria State Rys.

The Richmond, Petersburg & Carolina is having 15 cars built by the Georgia Car & Mfg. Co.

The Louisville, Evansville & St. Louis Consolidated is getting bids on 500 coal cars of 80,000 lbs. capacity.

We are officially informed that the Southern is not contemplating buying additional equipment at present.

We understand that the matter of box cars for the Atchison, Topeka & Santa Fe will be taken up for consideration on the return of Mr. Ripley from California.

We are informed that the Mexican Central has postponed the consideration of new equipment for the present.

The order of the Houston, East & West Texas for 50 box cars from Pullman's Palace Car Co., noted in our issue of June 9, has been increased to 100.

We are informed, but not officially, that the Illinois Central has asked two builders for prices on a large number of 40-ton box cars, but that the maker is not definitely settled upon.

The Georgia Car & Mfg. Co. has shipped a sample car for the Merida-Peto of Yucatan. The company is building two other sample cars of special design for South American roads, the understanding being that as soon as the style of car desired may be determined orders of considerable size will be placed.

The six vestibule chair cars ordered by the Houston & Texas Central from Pullman's Palace Car Co., as noted in our issue of last week, are for August delivery. They will be 60 ft. long, 10 ft. wide and equipped with Pullman standard axles, National hollow brake beams, Diamond "S" brake shoes, Westinghouse air brakes, National couplers, Pantasote curtains with Forsyth curtain fixtures, Safety steam heating system, Fletcher journal box lids, Pintsch gas, Pullman wide vestibules and steel platforms, standard six-wheel trucks with 36-in. Allen wheels, Pullman standard paint and Scarritt twin reclining chairs.

In our issue of June 16 we made mention of the fact that the Barney & Smith Car Co. was building 100 box cars for the St. Joseph, South Bend & Southern. They will be of 60,000 lbs. capacity, 36 ft. long, 8 ft. 8 in. wide, 6 ft. 8 in. high, of wood, with wood underframes. They will have M. C. B. axles, 9x13 oak trussed and fitched bolsters, wood trussed, outside hung brake beams, cast iron M. C. B. brake shoes, Westinghouse brakes, bronze lead-lined brasses, Tower couplers, Dunham door and door fixtures, M. C. B. cast iron journal boxes, M. C. B. presed steel journal box lids, Prince's mineral paint, Chicago galvanized iron roofs, 6x8 two-coil draft springs, Penn "W" 7 in. bolster springs, rigid Diamond trucks, M. C. B. 33 in. 600 lb. cast iron wheels.

The passenger cars being built by Harlan & Hollingsworth for the Seaboard Air Line will weigh about 78,000 lbs., will be 60 ft. long over sills, 9⅛ ft. wide over sills, 14 1/7 ft. high over all. They will be built of wood, with wood underframes lined with ½ in. iron plate. They will be equipped with frictionless side bearings made by the Chicago Railway Equipment Co., Babcock fire extinguishers, Westinghouse air brakes, Otis steel axles, double iron bolsters, National hollow brake beams, Corning brake shoes, Westinghouse brakes, Ajax metal brasses, Standard couplers, Acme curtain fixtures, Pantasote curtain materials, old bronze door fastenings, M. C. B. pocket attachment draft rigging, Baker heaters in connection with Safety car heating system, malleable iron journal boxes, Fletcher pressed steel journal box lids, Pintsch light, Flood & Conklin Paint, Acme Paint Co. truck enamel, Chicago varnish, Standard steel platforms, Monitor canvas covered and painted roofs, Hale & Kilburn seats, French and Scott springs, six-wheeled trucks, Pullman wide vestibules.

BRIDGE BUILDING.

ALBANY, GA.—The Plant System railroad bridge across the Flint River, reports state, partially collapsed last week.

ALBANY, PA.—A petition has been presented to the Commissioners of Berks County for a bridge over Mill Creek. Jacob D. Fister and Isaac Hein were appointed viewers.

ALLIANCE, O.—Plans are in consideration for an overhead bridge across the Fort Wayne Railroad tracks in West Alliance.

ASHLAND, PA.—A new bridge, according to report, will be built by the county near this place. The county bridge at Cressona, near Strauch's mill, will be repaired.

ATCHISON, KAN.—It is said that improvements to the amount of $80,000 will be made to the bridge over the Missouri River at this place.

BENWOOD, MD.—Reports state that an injunction has been served on the Baltimore & Ohio, restraining that railroad from building a new bridge on the piers of the old B. & O. bridge from Benwood to Bellaire; also from repairing the present bridge unless by permission of the Chief Engineer of the United States Army and the Secretary of War. The

present bridge now across the Ohio River, it is claimed, is a hindrance to navigation. The largest span is 322 ft. long, whereas the navigation law requires the main span to be at least 500 ft.

BOYERSTOWN, PA.—It is stated that an iron bridge will be built over the Reading Ave. crossing by the Philadelphia & Reading RR.

BROOKLYN, N. Y.—The Brooklyn Rapid Transit Co., according to report, will build a bridge to connect the Sea View RR., over the Brighton Beach line, with the race tracks at Sheepshead Bay.

CARROLLTON, MO.—Charles Finch, Borough Clerk, will receive bids until July 3 for a bridge of two spans, one 24 ft. and the other 40 ft. long, to be built over Branch River at Carrollton.

CARROLITOS, CAL.—The Santa Cruz County Supervisors have adopted plans of N. Mosher for the proposed bridge at this place. Bids on the work are now wanted.

CHICAGO, ILL.—The Illinois Central is devoting a great deal of attention to building new bridges between Chicago and Cairo, and on all of its branches.

CLEVELAND, O.—The Board of Park Commissioners are asking bids until June 28 for a 60-ft. span (56 ft. long masonry arch) at the Lake Shore & Michigan Southern crossing at Waverly Ave. C. W. Pratt, Jr., Chief Engineer.

COHOES, N. Y.—A petition is in circulation to have a large bridge built instead of the narrow structure for which plans have been made. (May 26, p. 377.)

COLUMBIA, S. C.—The Seaboard Air Line, according to report, has offered a free bridge across the Congaree River for consideration of a certain right of way. The city has had in consideration for some time a bridge across the river, which would probably cost $35,000.

COLUMBUS, TEX.—We are informed that the Commissioners of Colorado County will probably build two new bridges across the Colorado River, which is about 300 ft. wide at this place. One span of the 250-ft. iron bridge built by the King Bridge Co. at this place was recently washed away, and the County Court met on June 19 to consider plans to repair it. D. W. Jackson, Weimar, Tex., may be addressed.

COOPERSTOWN, N. D.—Mason Knapp, Town Clerk, will receive bids until July 1 for two new bridges.

CUMBERLAND, MD.—Following are the bids received June 6 for the ten steel bridges to be built by the county: Toledo Bridge Co., $3,950; Variety Iron Works, $3,968; Fort Pitt Bridge Co., $4,266; Wrought Iron Bridge Co., $4,298; Penn Bridge Co., $4,500; Pittsburg Bridge Co., $4,220; Youngstown Bridge Co., $5,076; Structural Iron Co., $4,398; Boston Bridge Works, $4,610; Groton Bridge & Mfg. Co., $4,510; Canton Bridge Co., $4,450; King Bridge Co., $4,600; Massillon Bridge Co., $4,700.

DARDANELLE, ARK.—The Dardanelle & Hot Springs will require several small bridges on the proposed railroad. See Railroad Construction column.

DICKINSON, N. D.—John Riessbeck, County Auditor, will receive bids until July 8 for a steel bridg to be built by the county.

DINUBA, CAL.—A bridge will probably be built by the Alta Board of Directors in consideration of a right of way.

DIXON, ILL.—Wm. B. McMahon, County Surveyor of Lee County, informs us that three birdges will be built over Green River; one in Lee Center Township, one in East Grove Township and the other in Marion Township, all in Lee County. Each township will pay half of the cost and the county the remainder. The bridges are 50 ft. to 75 ft. long and the cost for that for Lee Center Township is not to exceed $800, Marion Township, $1,200, and East Grove Township, $600. For further information in regard to Lee Center Township bridge write S. L. Shaw, Town Clerk, Lee Center, and for East Grove Township, Joseph Meurer, Town Clerk, Ohio, Bureau Co., Ill., and for Marion Township, Peter Campbell, Town Clerk, Walton, Ill.

EAGLE BRIDGE, N. Y.—It is said that an iron bridge with a span of 116 ft., and estimated to cost $6,000, will be built to replace a wooden structure at Eagle Bridge. Address M. H. Viets.

ELDORADO, KAN.—The Commissioners of Butler County will receive bids July 7 for a 14-ft. stone arch bridge over Slough River, the bridge to be similar to other stone structures built by the county. J. C. Smith, Eldorado, may be addressed.

EMPORIUM, PA.—We are informed that the County Commissioners are planning to build an iron bridge over Portage River.

EUGENE, ORE.—The Booth-Kelly Lumber Co. may need two bridges on their proposed railroad. See Oregon Roads in Railroad Construction column.

EVART, MICH.—The Groton Bridge Co. has the contract for building the bridge over the Muskegon River near Evart. It will be an iron bridge about 100 ft. long and will cost $2,975. The Township Board of Osceola recently let a contract to the Wrought Iron Bridge Co. of Canton, O., to repair a bridge at this place, for $1,800.

FARGO, N. D.—The County Commissioners have awarded contracts to John Jardine for three small county bridges. The County Auditor has ben authorized to advertise for bids for building a 40 ft. bridge between Casselton and Wheatland, over Swan Creek. It has been recommended to the Commissioners that a new bridge be built between Sections 22 and 23 in Maple River Township. O. J. Olson, County Auditor, will receive bids until July 10 for the steel bridge to be built across Maple River.

FORT WORTH, TEX.—Bids are wanted July 1 for a viaduct on Jennings Ave. John Hawley, City Engineer.

FRANKFORT, IND.—John A. Ross, of Frankfort, Ind., has been awarded the contract for the seven county bridges for which proposals were received June 5, at $4,885. Other proposals received by the County Commissioners were from Dunn & Goar, Frankfort, Ind., $4,962; Wabash Bridge Co., Wabash, Ind., $5,200; Indianapolis Bridge & Iron Works, $5,178; New Castle Bridge Co., $5,180; Attica Bridge Co., $5,400, and the Brackett Bridge Co., $4,992. (June 2, p. 392.)

GILMER, TEX.—The County Commissioners, we are informed, are considering a new bridge over Sabine River.

GLENDIVE, MONT.—The County Commissioners have ordered a special election held July 12 to decide whether Dawson County shall expend $50,000 for rebuilding the bridge over the Yellowstone River at Glendive. (June 16, p. 437.)

HASTINGS, MICH.—We are informed that Hamilton Fisher will receive bids for an iron bridge 130 ft. long over Thornapple River, in the Township of Hastings. It will be a highway bridge, setting on steel piles of 15 ft. to 23 ft., the bridge and piles to be put in by the same contractor.

HUMBOLDT, IA.—The Clinton Bridge Co., of Clinton, Ia., has been awarded the contract for a bridge of one span of 170 ft., with two 32-ft. wooden approaches, at $2,736.

HORNELLSVILLE, N. Y.—The time for receiving proposals for the 55-ft. plate girder bridge has been postponed from June 19 until July 15, by F. W. Dalrymple, City Engineer.

INDIANAPOLIS, IND.—The Board of Works has requested the City Comptroller to recommend an appropriation of $150,000, to be used in building new bridges over Falls Creek and White River. These bridges have been spoken of before.

JAMESTOWN, N. Y.—Plans, according to report, are in consideration for a bridge for an extension of Third St. It will probably be 800 ft. long and 70 ft. wide. Address George Jones, City Engineer. (March 17, p. 195.)

KALKASKA, MICH.—We are informed that plans are in consideration for a bridge over Torch River between Austrim and Kalkaska Counties. The bridge will probably be a steel structure 100 ft. long. It has not been decided whether it will be a drawbridge. Address D. P. Beebe, Kalkaska.

LOCKPORT, LA.—The Southern Bridge & Construction Co., of Houston, Tex., is said to be asking bids until July 10 for a brick pivot pier and protection piling for the steel bridge which they are building at Lockport.

MARSHALLTOWN, IA.—We are informed that no new bridges are contemplated by the county, but considerable repairing will probably be done. Wm. Brenner, County Surveyor.

McCONNELLSVILLE, PA.—Viewers have reported in favor of a county bridge over Tonoloway Creek; also for a bridge over Sideling Hill Creek in Taylor Township, and for a third bridge over Brush Creek near Crystal Springs P. O., in Brush Creek Township. Geo. B. Daniels, Clerk of Fulton County.

MONTESANO, WASH.—July 1 is the date set for receiving bids for the three county bridges. Address J. A. Sells, County Auditor.

MONTICELLO, MO.—George H. Roberts, County Commissioner, will receive bids until June 26 for three span bridges of 170 ft., 128 ft. and 42 ft. respectively. These bridges will be built by Lewis County across Wyaconda River, at La Grange. The contract for the substructure will be let on the 24th.

MOUND CITY, KAN.—The County Commissioners will receive bids in July for a 200-ft. iron bridge, to be built over the Marais des Cygnes River, in Linn County. The estimated cost is $7,000. Adress John L. Gove.

MOUNTAIN HOME, ARK.—Lum Bryant, we are informed, will receive bids July 3 for a 50-ft. iron bridge to be built over Cox Creek at Mountain Home.

NASHVILLE, ILL.—We are informed by County Surveyor Wm. B. Anderson that an iron brige is in contemplation over Mud Creek, near Coulterville, by Oakdale Township and Road Dist. No. 44, Perry County. Estimated cost $1,400.

NATCHITOCHES, LA.—A citizens' league is endeavoring to have the Parish of Natchitoches build a bridge over Red River at this place.

NEW YORK, N. Y.—It is said John C. Sheehan, O'Brien and McBean have the contract, at $107,000, for the bridge to be built at 153d St. Stephens & O'Rourke are said to have the contract for the Melrose viaduct, which will connect Melrose Ave. with Webster Ave., at $164,000.

OLATHE, KAN.—John King has been awarded a contract for a 60-ft. stone bridge over Cedar River for Johnson County.

ORLAND, CAL.—See Willows, Cal., below.

OWEGO, N. Y.—The Nicholas Bridge Co. has been incorporated with a capital of $25,000 to build a steel bridge at a point about 200 ft. below the present ferry. Ellery Colby and Thos. H. Reddis of Owego are interested.

PAINESVILLE, O.—The following bids for the highway bridge over the Grand River to Fairport were opened June 7 by County Auditor W. C. Tisdel. Superstructure: King Bridge Co., Cleveland, $19,500; Youngstown Bridge Co., Youngstown, $21,200; Variety Iron Works Co., Cleveland, $22,710; Brackett Bridge Co., Cincinnati, $23,000; Masillon Bridge Co., Masillon, $25,000; Structural Iron Co., Baltimore, Md., $23,200; Wrought Iron Bridge Co., Canton, $22,800. The bids for the substructure were from More, Mayer, Williams & Tubman, $13,178; Doolittle, Doolittle & Berg, 2042 Woodland Hills Ave., Cleveland, $13,984. (June 2, p. 392.)

TARIFFVILLE, CONN.—The railroad trestle leading to the iron bridge over the Farmington River at this place, according to report, was partly destroyed by fire last week.

PHILADELPHIA, PA.—Mayor Samuel H. Ashbridge wants bids until June 26 for $5,600,000 for municipal improvements, $900,000 of which will be used for removing grade crossings on the line of the Philadelphia & Trenton Railroad, now a part of the Pennsylvania.

PITTSBURGH, PA.—The Monongahela Connecting RR. Co., according to report, will rebuild their bridge so as to permit of two tracks.

PLAINFIELD, N. J.—The Somerset County Board of Freeholders are considering the advisability of building a new bridge on Girard Ave.

PLATO, ILL.—It is proposed to build an $8,000 bridge across the Iroquois River, and a special election will be held to decide upon an issue of $4,000 bonds, the balance being paid by the county.

PLACERVILLE, CAL.—New plans and specifications for the approaches to the Wisconsin Bar bridge have been ordered prepared.

PORT ORCHARD, WASH.—Sealed bids for construction of bridge in Road District No. 11, on road known as Watts Road, will be received by the County Commissioners at July meeting. Bidders to furnish specifications. Particulars from R. W. Condon, Commissioner, Port Gamble. Bids must be filed with City Auditor on or before July 3. C. W. Clausen, Auditor of Kitsap County.

PULASKI CITY, VA.—Again it is reported that plans are in contemplation for a steel bridge over New River near this place.

RED BLUFF, CAL.—No bids were submitted to the Board of Supervisors for construction of the Hatch road, in District No. 1, so the bids for the bridges on the proposed road were returned to bidders unopened, and further consideration of the matter postponed.

ROCKFORD, ILL.—According to report, an iron bridge will be built across the railroad tracks at Winnebago St., and another structure built at Auburn St. Edwin Main, City Engineer.

ROSSTON, ARK.—The Commissioners of Nevada County will soon want bids for six bridges. Address W. B. Wallas, County Commissioner, Prescott, Ark. Contracts will be let on the 26th inst., to rebuild the bridges and raise the levee across the Carouse.

SAN JOSE, CAL.—Plans and specifications have been adopted for the proposed bridge over Los Gatos Creek, at Campbell Ave. Bids are wanted July 3. Bids are also wanted at the same date for a bridge over San Antonio Creek. The Julian St. bridge across Coyotte Creek will be temporarily repaired. It has not been decided to build a new bridge. (May 26, p. 377.)

VERNAL, UTAH.—The owners of the Dywer mine propose to build a road from the mine to the nearest point on the Union Pacific. It will be necessary to bridge Green River, which will be the greatest expense.

VISALIA, CAL.—Bids will be received by John Cutler, Jr., County Clerk, July 18, for building a bridge over Tule River, Tulare County. Specifications for work are on file in office of Board of Supervisors, to which bidders are referred.

WASHINGTON, D. C.—It is reported that Acting Secretary Meiklejohn and Gen. Wilson, Chief of Engineers, have decided to invite proposals from at least 15 of the prominent bridge builders of the country for the memorial bridge over the Potomac River, connecting the observatory grounds with Arlington. It is the intention to purchase the three designs and specifications deemed most meritorious, paying for the first $1,800, for the second $1,200, and for the third $1,000, leaving $1,000 to defray incidental expenses. The other competitors will be allowed to withdraw their plans.

WATERTOWN, MASS.—Following are the bids for the stone arch bridge over the Charles River at Bridge St., which were received by Town Engineer W. F. Learned, June 12: R. D. Shannahan, $6,300; Ross & Fowler, $6,350; Norcross Bros., $7,742; Holbrook, Cabot & Daly, $7,780; Trumbull & Co., $10,741; A. B. Murdough, Watertown, $8,592; Harris & Letteney, $17,900.

WESTFIELD, MASS.—The directors of Woronoco St. Ry. Co. have let a contract for building the road, which includes three new bridges, to Fred T. Lay & Co., of Springfield, for $56,000. Sub-contracts for the bridge work have been let to the Walsh Boiler and Iron Works, of Springfield, work on the bridges to be completed Sept. 15.

WILKESBARRE, PA.—The County Commissioners have awarded contracts for the bridges which have been advertised since June 1. In all contracts for 34 bridges were let. The Penn Bridge Co., of Beaver Falls, Pa., received contracts for seven bridges, the total cost of which is $7,181. Jasper Winans, of Shickshinny, Pa., also received contracts for seven bridges. A. W. Scott, of Koonsville, got four bridges; W. A. Culver, of Register, two; John Shaffer, of White Haven, two; E. A Stahl, White Haven, two; Philip Lamoreaux, of Lehman, two; George Finney, Luzerne Borough, also two. The following received contract for one structure each: Wm. Keal, Upper Lehigh; I. A. Long, Sweet Valley; Wilson Gibbons, Harveyville; John Flickinger, Dorrance; Harry C. Eaton, Pittston, and Michael Whalen, Avoed.

The balance of the list advertised was not awarded on account of lack of money in the bridge fund. The contracts given out amount to $15,657. (June 9, p. 415.)

WILLMAR, MINN.—We are informed that the building of several wooden bridges is the only work in the bridge line contemplated by Kandiyoki County this year. Address Lewis Johnson.

WILLOWS, CAL.—The Southern Pacific will probably build a steel bridge across Story Creek, at Orland; also one across Walker Creek, between this place and Germantown.

WINDHAM, MINN.—We are informed that bids are wanted by the County Commissioners July 13 for an 80-ft. steel bridge, to be built over the Des Moines River near this place. J. S. Kibbey, County Treasurer.

YANKTON, S. D.—The Yankton Union Bridge Co. has been organized with a capital of $600,000, by W. W. Graham of Norwalk and others, to build the proposed railroad and wagon bridge across the Missouri River, under the terms of the charter granted by the last Congress. The bridge will be used by the Yankton, Norfolk & Southwestern RR.

YOUNGSTOWN, O.—The Commissioners of Mahoning County will sell bonds on July 10 to the amount of $25,000 for building the Market St. bridge across the Mahoning River at Youngstown. C. F. Brenner, Auditor, Cleveland.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Chicago, Rock Island & Pacific.—Quarterly, 1¼ per cent., payable Aug. 1.
Des Moines & Fort Dodge.—Annual, preferred, 7 per cent., payable Aug. 1.
Fitchburg.—Semi-annual 2 per cent., payable July 15.
Minneapolis & St. Louis.—Semi-annual, second preferred, 2½ per cent., payable July 15.
Northern Pacific.—Quarterly, common, 1 per cent., payable Aug. 3.

Railway Special Agents.

The Railway Special Agents' Association of the United States and Canada held its annual meeting at Detroit June 14 and 15. The officers chosen for the ensuing year are: W. F. Riley, Chicago & Northwestern, President; John De Long, Missouri Pacific, C. H. Dawson, Chicago, Burlington & Quincy, and W. H. Reno, Colorado & Southern, Vice-Presidents; John J. Linne, Superintendent of the special service of the Santa Fe route, Secretary and Treasurer, re-elected. The next meeting will be held at St. Paul June 12, 1900.

Railroad Club Secretaries.

The annual meeting of the Railroad Club Secretaries' Association of the United States was held June 14, at 1.30 P. M., in the parlor of the Hygeia Hotel, at Old Point Comfort, with Chairman Wheatley in the chair. There were present Messrs. Wheatley, Charpiot, Vought, Roberts, Janes, Dixon and Brady. The constitution was changed so as to call for one more meeting annually, on the day the Master Car Builders' Association convenes. Heretofore meetings have been held semi-annually. E. L. Janes, Secretary New England Railroad Club, notified the several secretaries present that hereafter his club would discontinue the free exchange of proceedings and that members of that club desiring other club's proceedings can obtain them by payment of a price agreed upon by the New England Railroad Club, which would be governed by the number of issues yearly.

The treasurer was instructed to make an assessment of $500 from each club to pay the expenses of the associations' work during the coming year.

The election of officers resulted as follows:

Chairman, H. L. Vought, Secretary of Central R. R. Club, Buffalo, N. Y.; Vice-Chiarman, E. L. Janes, Secretary New England RR. Club; Secretary-Treasurer, H. H. Roberts, Secretary St. Louis Ry. Club.

PERSONAL

(For other personal mention see Elections and Appointments.)

—Mr. James M. Freeman has been appointed Deputy Railroad Commissioner of the state of Rhode Island. Mr. Freeman is the son of Commissioner Edward L. Freeman and is appointed with a view to having an officer who can act in case of the absence of the Commissioner from the state. The Deputy Commissioner is to serve without pay.

—Among the honors conferred by Queen Victoria on her eightieth birthday was knighthood for Mr. William Pollitt, General Manager of the Great Central Ry. Sir William Pollitt is 57 years old and has been in the service of the Great Central and its predecessor, the Manchester, Sheffield & Lincolnshire, for 42 years. He was made General Manager in 1896.

—Mr. Alexander Milloy, late Traffic Manager of the Richelieu & Ontario Navigation Co., died at his home in Montreal, Que., June 1, aged 77 years. Mr. Milloy was born in Kintyre, Argyleshire, Scotland, on Jan. 6, 1822, and entered the service of the Canadian Steamboat and Mail Coach Co. in 1840. This company in 1875 was merged into the R. & O. N. C., from which Mr. Milloy resigned as Traffic Manager about 18 months ago. He held the rank of major in the Prince of Wales Rifles and was one of the oldest members of the American Presbyterian Church.

ELECTIONS AND APPOINTMENTS.

Atlantic Coast Line.—R. J. Latta has been appointed Acting Chief Engineer, with headquarters at Wilmington, N. C., succeeding Fleming Gardner, deceased.

Baltimore & Ohio.—The jurisdiction of General Superintendent Thomas Fitzgerald has been extended over the main line, including branches, from Philadelphia to Chicago. J. M. Graham has been appointed Chief Engineer, with headquarters at Baltimore, Md., succeeding W. T. Manning, recently resigned. P. H. Irwin has been appointed Assistant Chief Engineer. The jurisdiction of John E. Spurrier, Superintendent of the First Division and branches, with headquarters at Baltimore, Md., will be extended over the Second Division. F. A. Husted, heretofore Superintendent of the Middle Division, has been appointed Superintendent of the Third, Fourth and Fifth Divisions, with headquarters at Grafton, W. Va. R. M. Sheats, heretofore Superintendent of the Fourth and Fifth Divisions, has been appointed Superintendent of the Chicago Terminals. T. J. English, heretofore Superintendent of the Chicago Division, has been appointed Superintendent of the Ohio and Midland Divisions, with headquarters at Newark, O., succeeding J. H. Glover, transferred. F. C. Batchelder, heretofore Superintendent of the Minneapolis, St. Paul & Sault Ste. Marie at Minneapolis, Minn., has been appointed Superintendent of the Chicago Division, with headquarters at Garrett, Ind. Charles Galloway, heretofore Trainmaster of the First Division, has been appointed Assistant Superintendent of the First and Second Divisions of the B. & O., with headquarters Cumberland, Md. The office of General Superintendent of the Trans-Ohio lines has been abolished. Effective July 1.

Canadian Pacific.—W. R. MacInnes has been appointed General Freight Agent west of Lake Superior, with headquarters at Winnipeg, Man. A. H. Notman, heretofore Assistant General Passenger Agent at St. John, N. B., has been appointed Assistant General Passenger Agent, with headquarters at Toronto, Ont., succeeding C. E. McPherson.

A. T. Heath has been appointed Assistant General Passenger Agent, with headquarters at St. John, N. B., succeeding A. H. Notman.

Central of New Jersey.—George H. Frech, heretofore Division Superintendent at Jersey City, N. J., has been appointed Superintendent of the New Jersey Southern and Freehold & Atlantic Highlands divisions, succeeding W. V. Clark, resigned. W. W. Wentz, Jr., Superintendent of the Lehigh & Susquehanna Division, will also assume the duties of Superintendent of the Central Division. Effective June 21.

Central Vermont.—The office of Trainmaster at New London, Conn., has been abolished.

Chicago & Northwestern.—W. D. Cantillon, heretofore Assistant Division Superintendent at Milwaukee, Wis., has been appointed Division Superintendent, with headquarters at Winona, Minn., succeeding W. P. Cosgrave, resigned. F. R. Pechin has been appointed Assistant Division Superintendent, with headquarters at Milwaukee, Wis., succeeding W. D. Cantillon. The lines between Jewell Junction and Onawa and between Maple River Junction and Moville, Ia., will hereafter be known as the Western Iowa Division. The lines between Wall Lake and Denison and between Mondamin and Boyer, when completed, will be operated as a part of this Division and S. M. Braden has been appointed Superintendent, with headquarters at Lake City, Ia. The line between Burt, Ia., and Sanborn, Minn., when completed, will be operated as a part of the Northern Iowa Division. W. D. Hodge has been appointed Superintendent, with headquarters at Eagle Grove, Ia.

G. R. Henderson, who recently resigned as Mechanical Engineer of the Norfolk & Western to accept the position of Mechanical Engineer of the Schenectady Locomotive Works (see "Personals," March 17, p. 196), has been appointed Assistant Superintendent of Motive Power and Machinery, succeeding W. H. Marshall, resigned.

Cleveland, Akron & Columbus.—James E. Hannegan, Assistant General Passenger Agent, with headquarters at Cleveland, O., has resigned. J. P. Henderson has been appointed Assistant Treasurer and H. O. Hukill Purchasing Agent.

Delaware, Lackawanna & Western.—Garrett Bogart, Division Superintendent, with headquarters at Scranton, Pa., has resigned.

Erie.—G. W. Dowe has been appointed Superintendent of the Allegheny Division, succeeding H. E. Gilpin, resigned. F. N. Hibbits has been appointed Superintendent of the Jefferson Division, succeeding G. W. Dowe.

Erie & Wyoming Valley.—At a meeting of the stockholders the following Directors were elected: Sidney Williams, Scranton, Pa.; Wilson D. Decker, Dunmore, Pa., and Charles P. Savage, Dunmore, Pa.

Ft. Worth & Rio Grande.—J. W. Ravlin, Superintendent Transportation, with headquarters at Fort Worth, Tex., has resigned.

Fremont, Elkhorn & Missouri Valley.—Hiram R. McCullough has been elected Second Vice-President, with headquarters at No. 22 Fifth avenue, Chicago, Ill.

Kansas City, Pittsburgh & Gulf.—F. Mertsheimer has been appointed Superintendent of Motive Power and Machinery, with headquarters at Kansas City, Mo.

Keokuk & Western.—T. R. Board, heretofore Auditor and Car Service Agent, has been appointed Assistant Treasurer and General Passenger Agent, with headquarters at Keokuk, Ia., succeeding J. F. Elder, resigned.

Missouri Pacific.—Mord Roberts, Division Master Mechanic, with headquarters at De Soto, Mo., and Little Rock, Ark., has resigned.

Mobile & Ohio.—John G. Minnice has been appointed Trainmaster, with headquarters at Tuscaloosa, Ala., succeeding W. N. Jones.

New York, Philadelphia & Norfolk.—At a meeting of the stockholders William A. Patton, heretofore Vice-President, was elected President, succeeding A. J. Cassatt, resigned.

Northern Central.—A. J. Cassatt was elected President at a meeting held June 15, and A. Loudon Snowden was elected a Director, succeeding Mr. Cassatt. S. M. Prevost was also elected a Director, succeeding J. N. Hutchinson, deceased.

Pennsylvania.—Samuel Rea, heretofore First Assistant to the President, has been elected Fourth Vice-President.

C. R. McMillan has been appointed Assistant Supervisor, with headquarters at New Brunswick, N. J., succeeding J. F. Chandler.

Rensselaer & Saratoga.—At a meeting of the stockholders, held June 5, George B. Warren was elected Vice-President.

Rock Island & Peoria.—At a meeting of the stockholders R. H. Hudson was elected Secretary and H. P. Gregough Treasurer. At the same meeting A. R. Flower of New York and C. F. Liende of Rock Island, Ill., were elected Directors.

St. Joseph Terminal.—At a meeting of the stockholders, held June 13, J. E. Elder was elected Secretary and Auditor.

Salt Lake & Mercur.—T. J. Mackintosh has been appointed General Superintendent, with headquarters at Mercur, Utah.

South Carolina & Georgia.—F. A. Healy has been appointed Assistant Auditor, with headquarters at Charleston, S. C.

Southern.—W. L. Bird, heretofore Auditor of the Carolina Midland, has accepted a position in the Auditing Department of the Southern, with headquarters at Washington, D. C.

Southern Indiana.—L. A. Walton has been elected Treasurer, succeeding A. N. Sullivan, resigned.

Tennessee Central.—R. D. Yoakum has been appointed Traffic Manager, with headquarters at St. Louis, Mo. C. F. Newton has been appointed Superintendent, with headquarters at Rockwood, Tenn.

Texas & Pacific.—A Freight and Passenger Agency has been opened by this company in the Philippines, with headquarters at Manila, in charge of J. L. Logan.

RAILROAD CONSTRUCTION,
New Incorporations, Surveys, Etc.

ALABAMA ROADS.—Thomas M. Owen is making arangements to build a line from Carrollton northeast 10 miles to Reform, on the Columbus & Montgomery Division of the Mobile & Ohio. Among those interested are O. L. McKinstry, President of the Tuskaloosa St. Ry., and the people are subscribing to the project.

The proposed railroad from Montgomery through Mixburg, Kellyton and Fort Wayne to Chattanooga or Nashville, Tenn., is meeting with favor. Among the promoters is J. M. Darsey, of Hissup, Ala.

ARKANSAS ROADS.—The Arkansas Construction Company of Little Rock on June 17 took the contract for building the logging road of Sawyer & Austin, of La Crosse, Wis., to run from Pine Bluff, Ark., west 12 miles, to the company's timber lands. (May 26, p. 379.)

ASTORIA & COLUMBIA RIVER.—An extension is under consideration from Seaside, Ore., south about 50 miles along the coast to Tillamook. The people of Astoria and other places interested have given assurance of support.

ATCHISON, TOPEKA & SANTA FE.—Grading has been completed to Bartlesville, I. T., and six miles of track is laid south from Caney, on the Kansas, Oklahoma Central & Southwestern extension from Caney, Kan., south 50 miles to Collinsville. Men are at work at Caney, Bartlesville and Collinsville. (May 12, p. 343.)

Improvements are in progress on the El Dorado branch from Florence, Kan., south 42 miles, to Augusta. The track is being regraded and raised in places preparatory to relaying 65-lb. rails and reballasting.

BANGOR & AROOSTOOK.—John B. Carter has 500 men at work and expects 300 more soon for the proposed extension from Caribou, Me., north 30 miles through Sweden and Stockholm into Van Buren. He expects to have sufficient grading done by the middle of July to permit the company to lay 12 miles of line. Nearly the entire right of way is cleared and grading is going on rapidly. (May 5, p. 323.)

BELLEFONTE CENTRAL.—Rails are bought, according to report, for an extension of about one mile to the Mattern ore banks in Pennsylvania.

CALIFORNIA ROADS.—The Brooking Lumber & Box Co., of San Bernardino, will build a narrow gage road three to five miles long in San Bernardino.

CANADIAN NORTHERN.—Mr. Mann, of the contracting firm of Mackenzie & Mann, makes the following statement as to the plans of the company in Manitoba and the northwest:

Under our charter we have power to build a line from Port Arthur, on Lake Superior, to Prince Albert, in Winnipeg, and are now asking Parliament for permission to extend our line to Edmonton, following the valley of the Saskatchewan River. We will have about 300 miles completed north of Winnipeg this season, and we intend to build on to Edmonton at the rate of about 100 miles a year, or as fast as the country is settled. We shall build about 150 miles between Winnipeg and Port Arthur this season. We have no plans at present for a transcontinental line and will confine ourselves to the 1,300 or 1,400 miles of road already named. A thousand miles of this district is wheat-growing country.

An effort was made to obtain right of way between Winnipeg and Portage la Prairie over the tracks of the Northern Pacific, but that company has definitely refused to grant such permission. The reason for the refusal is stated by an official of the N. P. to be the unwillingness on the part of Mackenzie & Mann to pay the rates demanded. (June 9, p. 417.)

CANADIAN PACIFIC.—Application will be made at the coming Legislature for an act to permit this company to complete its Deloraine extension west about 25 miles in Manitoba, and also for a line from a point on the Manitoba Southwestern between Manitou and Pilot Mound, to run southwest to a point near the International boundary. (May 19, p. 359.)

CAROLINA NORTHERN.—A large number of men are grading in the direction of Marion, S. C., on this line, from Lumberton, N. C., southwest 45 miles to Marion, and surveys are in progress westward toward Cape Fear River. Albert A. Sparks, of Lumberton, N. C., is President. (May 26, p. 379.)

CHATTAHOOCHEE VALLEY.—Grading is begun on this proposed line from West Point to Columbus, Ga. It will be about 30 miles long, of which 21 miles is already completed. (June 16, p. 439.)

CHATTANOOGA, ROME & SOUTHERN.—A delegation of Heard County, Ga., people has called upon the officials of this company with reference to the proposed extension south through Franklin to West Point. The people are asked to contribute $25,000 and right of way along the line. (June 16, p. 439.)

CHEAT VALLEY.—Grading has been resumed on the line from Rawlesburg W. Va., northeast to Point Marion. Several miles of track was laid last year. J. J. Stoer of Rawlesburg, is President. (March 10, p. 179.)

CHICAGO, BURLINGTON & QUINCY.—Officials of this company are reported to have recently made an investigating tour looking to an extension from Hill City, S. D., southeast about 12 miles, via Sheridan, to Keystone. The line would open up the old Blue Lead copper mine, near Sheridan. Surveys are completed for the proposed cut-offs from a point on the Keokuk & Western near Decatur City, Ia., to run west 11 miles to Kellerton, and from Grant City, Mo., south 21 miles to Albany on the Kansas City branch. These will shorten the distance between Des Moines, Ia., and Kansas City. (May 26, p. 379.)

Contracts have been let as follows for a portion of the extension of the Burlington & Missouri River from Alliance, Neb., south about 160 miles to Brush, Col.: Mike Ellmore, five miles; R. C. Cushing & Co., six miles; Andrew Sheridan, five miles; J. H. McShane & Co., 10 miles; Samuel Santell, 10 miles; J. Sharp, 10 miles.

CHICAGO, PEORIA & WESTERN.—This company has added considerable trackage to the Davenport terminals and has made trackage arrangements with the Davenport Bridge and Terminal Co. for rights from Davenport to Moline; also with the Chicago Terminal Transfer for rights over its entire system in Chicago in connection with the com-

pany's own terminals. (Sept. 9, 1898, p. 656.) W. J. Gorman, 845 The Rookery, Chicago, is General Manager. (Official.)

CHICAGO, PEORIA, MISSOURI & TEXAS.—The report of the incorporation of this company in Illinois as given last week (p. 439), appears to have been premature. The Secretary of State has received letters from a number of persons asking if the road has been, or can be, incorporated, but no incorporation papers are yet filed. It is understood that the new company will absorb the Chicago, Peoria & St. Louis, now undergoing reorganization, and that it will have a southern feeder from East St. Louis to cover Southern Illinois, crossing the State line at parallel and going through Missouri and Arkanses into Texas. From Peoria it is intended to secure an entrance into Chicago with connections to Iowa and other northern points.

COLORADO & SOUTHERN.—This company is building a mineral belt line at Leadville, Col., about five miles long, of which one mile is already completed.

COTTAGE GROVE & BOHEMIA.—Arrangements are being made, according to report, to survey this line, projected in Lane County, Ore., from Cottage Grove, on the Southern Pacific, to the Bohemian mines. W. H. Oglesby, of Cottage Grove, is among those interested. (Feb. 10, p. 108.)

DAKOTA PACIFIC.—This company is reported to have sold to a Boston syndicate $630,000 of bonds for building this projected line from Rapid City, S. D., west 32½ miles to Mystic, on the Chicago, Burlington & Quincy. Most of the grading is completed and about eight miles of track laid under the old company, the Dakota, Wyoming & Missouri. C. D. Crouch of Chicago has the contract. W. T. Coad of Rapid City is President. (D. W. & M., Jan. 21, 1898, p. 50.)

DARDANELLE & HOT SPRINGS.—The promoters of this line have a land grant in Yell County, Ark. Right of way is being secured and it is expected to begin building during the present year. The road is run from Dardanelle south 88 miles to Hot Springs. Several small bridges will be required. James K. Perry of Dardanelle is one of the projectors.

DENVER, KANSAS & GULF.—This company has been incorporated in Indian Territory to build a line from Sabine Pass, Tex., north through the territory to Denver, Col. Among the directors are: J. A. Overstret and F. L. Winkler of Kingfisher, Okla.

DOOLEY SOUTHERN.—This company proposes t build an extension from Pinia, Ga., southeast about 30 miles to connect with the Tifton & Northeastern at Irwinville. The road now runs from Pinia northwest to Richwood, eight miles.

ELK VALLEY.—J. C. Monday of Knoxville has secured the contract for building this line, which is to be about 1½ miles long, at Elk Valley, Tenn. It is to be completed by Aug. 1.

GREAT NORTHWEST CENTRAL.—Following the grant by the Canadian Parliament to the Canadian Pacific, which owns this road, for an extension of time for its completion, grade stakes have been placed at the MacGregor end and at least 25 miles will be completed this year. (June 9, p. 417.)

GULF, BEAUMONT & KANSAS CITY.—Arrangements are made, according to report, for an extension of this line from Jasper, north 50 miles, to connect with the St. Louis & Southwestern at Lufkin, Tex., and also to extend the line from Newtonville, Tex., to Waskom on the Missouri, Kansas & Texas. (June 2, p. 393.)

HARRIMAN & NORTHEASTERN.—Surveys are made for the proposed extension from Stephens, Tenn., west about six miles to Wartburg.

HOUSTON, BRAZOS & NORTHERN.—The line of this company, as projected, is from Houston, Tex., north along the Brazos Valley to Fort Worth, about 250 miles. The company controls the Texas Western from Houston to Sealy, 53 miles. This is to be changed to standard gage and to form a portion of the road. Elijah Smith of Houston is a promoter.

ILLINOIS CENTRAL.—Citizens of Grenada are trying to induce this company to build an extension from Parsons, La., east about 15 miles to Grenada. The company asks a bonus of $15,000 and right of way.

INDIANA, ILLINOIS & IOWA.—D. D. Streeter, of Chicago, has the contract for grading, bridging, fencing and masonry work on the extension from Streator, Ill., west to a junction with the Chicago, Burlington & Quincy, about 10 miles west of the Illinois River. (June 9, p. 417.)

KOOTENAY RAILWAY & NAVIGATION.—In January last Foley Bros., Larsen & Halverson received the contract to build the 50-mile section from Bonner's Ferry, Ida., north to Kootenay Lake, B. C. The Idaho section is incorporated under the name of the Kootenay Valley, and that portion in British Columbia under the name of the Bedlington & Nelson. The company has been granted permission to use from 8½ to 15 miles of the C. P. R. tracks through the Crow's Nest Pass on payment of mileage rates. The lines were located by N. D. Miller, Chief Engineer of the Great Northern, and that company, according to report, is financing the roads. The entire line is to be completed by August. J. F. Stevens, who is superintending the building, reports that work is well advanced all along the line, including the big bridge and trestle at Bonner's Ferry. (Dec. 23, 1898, p. 923.)

Under the charter of the Kaslo & Slocan, another line is being built into the Trout River District, B. C., of which the first 35 miles is to be completed by September. A fight between the C. P. R. and this company over right of way through the Lardeau-Duncan Pass has been settled, and both companies are allowed to lay tracks through the pass. (Jan. 20, p. 53.)

LAKE TAHOE.—Grading is in progress on this line from Truckee, Cal., south 15 miles to Tahoe City on Lake Tahoe. D. L. Bliss, of Carson City, is President and General Manager. (May 19, p. 359.)

LAUREL & NORTHWESTERN.—Grading is in progress at three points, Hattiesburg, Laurel and Jackson, Miss., on this line, which, as noted in the News column, has been bought by the Gulf & Ship Island. At Jackson the line will make close connection with the Illinois Central trains for northern points. About 15 miles are now completed from Laurel northwest, and surveys are in progress to connect the line with the Gulf & Ship Island at Hattiesburg, and to make the extension northwest to Jackson. (April 14, p. 271.)

MANITOBA & SOUTHEASTERN.—This line, of which 46 miles was built from St. Boniface, Man., to La Broquerie last season, has been acquired by Mackenzie & Mann and the contract is let to Neil Keith, of Winnipeg, to build the extension southeast about 50 miles to the international boundary. The company hopes to reach Rainy River by the fall. The line is located to that point, and the connecting link from the east has been located for the greater part of the distance. The section from the international boundary to Rainy River, in Minnesota, has been incorporated in that State as the Minnesota & Manitoba, with a capital stock of $1,000,000. (April 21, p. 289.) Mackenzie & Mann are making application to the Dominion Parliament for an immense subsidy, but were told if they wanted to get it, they must build north of the lake and all within Canadian territory. This would make the line about 30 miles shorter, but would cost about $1,500,000 more to build. (May 5, p. 323.)

M'DONALD & BLUEFIELD.—This company has been incorporated in West Virginia to build a railroad from McDonald south about 50 miles through Beckley, on the Glade Creek & Raleigh, to Bluefield, connecting with the Norfolk & Western. Among the incorporators are: Symington McDonald and Samuel Dixon, of McDonald; Enoch M. Smith, A. L. Ruffner and M. P. Ruffner, of Charleston, W. Va.

MENOMINEE & ST. PAUL.—Henry W. Ashley, General Manager of the Ann Arbor, makes the following statement with reference to this new company:

The fact that I am a director does not indicate that the Menominee & St. Paul Railway is an Ann Arbor railway enterprise. The road is being built and projected by Menominee capital. It is expected that the part of the line which lies in Michigan will be built this summer. All of the bridges and material have been purchased and the survey completed. Menominee expects by building a line to St. Paul to put itself on the same basis as Milwaukee. The length of the road is 300 miles. It will be a great benefit to Menominee. (June 16, p. 433.)

MEXICAN ROADS.—J. M. Neeland and H. R. Yera, of Los Angeles, Cal., who represent a New York company, have obtained concession from the Mexican Government for a railroad from Cordova, State of Vera Cruz, to run southeast about 250 miles to the Isthmus of Tehuantepec.

Senor Ignacio Borda, of Mexico City, has obtained from the Mexican Government a concession for his proposed road, already noted in this column. (Oct. 21, 1898, p. 768.) The road is to run from Guadalajara to Ciudad Guzman, both in the State Jailsco. The concession provides that building must be begun within 18 months, and the first 30 km. (18.6 miles) completed within three years, and another 30 km. each subsequent period of two years. Eight years from the date of the contract is given for the entire completion of the road. No subsidies are given, but the road is exempt from all taxes, Federal, State or municipal, except the Stamp Act, for 15 years.

A corporation styled "Compañie de los Ferrocarriles Sud-Orientales en Yucatan, S. A.," has been organized with a capital of $1,250,000 to take over the railroad and land concessions granted on May 19, 1897, and March 19, 1898, to Lic, Joaquin D. Casasus and Lic, Resendo Pineda. Don Manuel Sierra Mendes has been appointed Managing Director.

J. C. Morgan of Niagara Falls, N. Y., has applied to the Mexican Government for a concession to build a railroad from San Geronimo on the Isthmus of Tehuantepec, southeast to the frontier at Guatemala.

MISSOURI, KANSAS CITY & EASTERN.—The company makes announcement that surveys are in progress for the proposed extension from Quincy, Ill., east to some prominent commercial center. It will probably be built to Beardstown to connect with the Baltimore & Ohio Southwestern. (Kansas City, Pittsburgh & Gulf, April 14, p. 271.)

MOBILE & OHIO.—The officials confirm the report that this line is to be extended from Columbus, Miss., northwest to Okolona, and that grading will probably be begun next month.

MOBILE & WEST ALABAMA.—The Tuskaloosa, Ala., City Council has granted right of way through that city to this company for its proposed line from Mobile, Ala., north 200 miles to Florence. Mr. H. Austill, of Mobile, President, has just returned from New York, where he has interested capital in the road, and reports that arrangements are completed to build, provided right of way is secured and subscriptions to stock made sufficient to pay cost of terminal property and depot grounds. Steps will be taken in that direction at once. (Nov. 11, p. 820.)

MT. AIRY & EASTERN.—This company was incorporated in North Carolina June 12, with a capital stock of $26,000, to build a line from Mt. Airy, the terminus of the Atlantic & Yadkin line of the Southern, to run north about five miles to the Virginia State line. Among the incorporators are: T. E. Houston (President), Elkhorn, W. Va.; W. W. Wyche and W. L. Taylor, of Welch, W. Va., and W. H. Tunis, Mt. Airy.

NORTHERN PACIFIC.—An extension of the Tacoma, Olympia & Chehalis Valley line, according to report, is to be made in Washington east to the coal fields of Hanford Creek, and thence to the Cowlitz Valley. It is stated that he first five miles is to be built this year.

OREGON ROADS.—The Booth-Kelly Lumber Co., of Eugene, has made preliminary surveys for a railroad from Henderson, on the Southern Pacific, three miles south of Eugene, to run northeast about 14 miles, up the Mohawk River. A company is being formed to build a road and the lumber company guarantees 2,500 carloads of lumber per year to points outside the State. Bridges will be required over the Willamette and Mackenzie rivers. Efforts are being made to secure free right of way.

OREGON SHORT LINE.—Surveys are reported in progress for a change in the main line which would carry the road through Boise City, Ida. This would require a change of about 30 miles. (May 13, 1898, p. 349.)

OTTAWA & GATINEAU.—Petitions have been signed by residents along the proposed route, that this company extend its line, now projected to Manwaki, Ont., north to Eagle Bay on Great Victoria Lake. This line would tap valuable mineral lands. (June 9, p. 417.)

PACIFIC & ARCTIC RAILWAY & NAVIGATION.—This company was incorporated in the State of West Virginia, June 8, with a capital stock of $1,000,000, to build a railroad from a point on Lynn Canal, Skaguay Bay, Alaska, north 20 miles to Summit Lake, with power to operate steamers on Puget Sound and Columbia River. The incorporators are: D. M. Rowan, Geo. W. Rowan, Irvington, N. Y.; T. W. Moore, Webster Gillette, New York City; Edwin Medgley, London, Eng.

PACIFIC & IDAHO NORTHERN.—Lewis Hall, of Weiser, Ida., Treasurer of this company, is reported as saying that about four miles of track is laid and 20 miles graded, and that the company expects to have the entire 20 miles laid with rails before July 1. The road as projected is from Weiser, Ida., north 85 miles up the Weiser Valley, with a branch of 17 miles to the Seven Devils mining region. The entire line, according to Mr. Hall, will be completed by Jan. 1. (May 26, p. 379.)

PENNSYLVANIA.—The General Manager writes that no arrangements have been made for the reported extension beyond Rehoboth Station, Md. (June 9, p. 417.)

PENNSYLVANIA ROADS.—H. A. Douglass of Philadelphia, representing the New York syndicate in which J. Pierpont Morgan is said to be interested, has announced that a railroad will be built south through Greene County, Pa., to reach the coal fields above Wheeling. An effort is being made, according to report, to secure right of way of the Pittsburgh, Monongahela & Wheeling, which was surveyed in 1897. (P., M. & W., March 31, p. 236.)

PITTSBURGH, BESSEMER & LAKE ERIE.—Grading and track laying is in progress on the extension of the Union RR. to the new Carnegie works at West Homestead, Pa. When completed this will bring the railroad three miles nearer to Pittsburgh.

PHILADELPHIA & READING. — The double tracking on the Little Schuylkill branch, between East Manhanoy and Port Clinton, Pa., will be completed, it is reported, about the middle of August. There are about 145 men at work and over 30 miles of track is laid in the vicinity of Tamaqua. (March 10, p. 180.)

PORTO RICO ROADS.—Baron Emile de Erlanger, of London, who recently arrived in New York City, is reported as stating that the Porto Rico Ry. Co. has about 55 miles of its western section still to build, and about 180 miles of the eastern section. According to the Travellers' Guide, the road now runs from Carolina, west 14 miles to San Juan, and from San Juan west 62 miles to Camuy. There is then a break of a number of miles along the coast to Aguadilla, thence it runs south 34 miles to Hormigueros. At that point there is another break of several miles to Yanco, from which point the road runs east 22 miles to Ponce. The company has a contract with the old Spanish Government to complete the road, and the officials believe that this contract will be recognized by the American Government.

RUTLAND.—O'Brien & Sheehan, New York contractors, have about 400 men at work on the Rutland-Canadian extension from Burlington, Vt., north about 60 miles through Grand Isle to Alburgh. All but about 510 ft. of the filling-in between Colchester Point, on the mainland, and Allen's Point, on the Island, has been completed, and a drawbridge of about 150 ft. will be built at that point. About a mile of track is laid near Keeler's Bay, and another mile of track near Tromp's Point. (March 17, p. 198.)

ST. CROIX & DULUTH.—The Empire Lumber Co., of Winona, Minn., which owns 22 miles of railroad from Dedham, Wis., on the Great Northern, south to St. Croix River, is building an additional eight miles in Douglass County. There are 200 men at work and the company expects to have the grading completed July 15, and the road ready for operation Nov. 1. The company has 90 logging cars and two Porter mogul engines and expects to add somewhat to the rolling stock this Fall. N. Mills, of Dedham, is Superintendent, and W. P. Tearse, of the Empire Lumber Co., is Manager. (Wisconsin Roads, Feb. 3, p. 93.)

ST. JOHNS VALLEY.—This line will run along the south side of the St. John River from Fredericton, N. B., to Woodstock, 69½ miles, paralleling the C. P. R. on the other side of the river. About six miles is graded. Some of the maritime province papers claim that this road is new outlet for St. John in connection with the Grand Trunk and the Temisconata railroads, but J. E. McIntire and J. A. Evans, who are trustees for the New York syndicate, have made no statement as to the future of the road. (March 17, p. 198.)

SANTA FE, PRESCOTT & PHOENIX.—Locating surveys are made for the extension from Phoenix, Ariz., east to Mesa and Tempe, and it is stated that the prospects are good for immediate building.

SEABOARD AIR LINE.—The contract was to be let this week for the extension from Cheraw, S. C., southeast to Columbia, to connect with the Florida Central & Peninsular.

SHADY VALLEY.—This company was incorporated in Tennessee June 12, with a capital stock of $50,000, to build a railroad from the Virginia line through Johnson County, along Beaver Dam Creek to the foot of Crop Mt. The incorporators are: W. M. McGovern, C. J. St. John, W. S. Robinson, R. C. Donnelly and H. A. Donnelly.

SMETHPORT.—G. A. Gocella of Falls Creek, Pa., and W. A. Moore of Du Bois, have taken the contract for building this nine-mile line, connecting the Kushequa RR. with the Western New York & Pennsylvania, with the provision that the line will be completed by Sept. 1. Elisha K. Kane, of Kushequa, is President.

SOUTH BUFFALO.—Application was made June 14, to the New York State Railroad Commission for right of way for this line from Buffalo, south eight miles to West Seneca, on the Lake Shore & Michigan Southern. John J. Albright, of Buffalo, is Pres-

ident. The company proposes to connect the Lackawanna Iron and Steel Company's new steel plant with the lake front. (April 28, p. 305.)

SOUTHERN INDIANA.—Grading is being pushed in the vicinity of Luton, Ind., on the proposed extension from Elnora northwest 46 miles to Terre Haute, and the company expects to run trains into Luton within 60 days. (May 12, 343.)

SOUTHERN PACIFIC.—Surveys have been in progress for several weeks on the proposed extension of the Oxnard branch, from Oxnard, Cal., east 34 miles to Chatsworth Park. Grant Bros., of Los Angeles, have the contract and grading was begun with 75 men June 9, on the section of 18 miles to Somis. This section is to be completed within 60 days.

The officials announce extensive improvements under consideration at Galveston, Tex., which include the enlargement of terminal facilities and the building of docks.

TEXAS CENTRAL.—About 100 men are reported at work on the extension from Albany, Tex., northwest 40 miles to Stamford. (June 9, p. 418.)

TEXAS MIDLAND.—E. H. R. Green, President, is reported as saying that in view of the increased cost of materials the proposed extensions will probably not be taken up at once. The plans, as outlined, are to extend the line northeast about 100 miles from Paris, Tex., to Mena, Ark., and southwest about 70 miles from Ennis, Tex., to Waco.

VELASCO SUBURBAN & BELT LINE.—This company was incorporated in Texas June 15, with a capital stock of $25,000, to build a belt line around Velasco. Among the incorporators are E. D. Dorchester, B. Lindemuth and Wm. W. Anderson.

WABASH.—Since the negotiations have failed for the purchase or lease of the Centerville, Moravia & Albia, between Albia and Moravia, grading has been resumed on the new line from Moulton, Ia., north 27 miles to Albia. (May 12, p. 344.)

WEST VIRGINIA CENTRAL & PITTSBURGH.—The General Manager writes that there is nothing in the report that the company will build an extension from Bellington to Clarksburg, W. Va. If the line is built, as the newspapers are persistently reporting, it must be by some other company. (June 16, p. 440.)

WEST VIRGINIA SHORT LINE.—Gooch, Rinehart & Dennis, of Richmond, Va., began grading June 6, on this line from Clarksburg, W. Va., west 60 miles to New Martinsville. Three forces of men are at work at New Martinsville, Clarksburg and an intermediate point. (June 2, p. 394.)

WYOMING SOUTHERN.—T. J. Milner, Chief Engineer, at Rawlins, Wyo., has begun surveys from Saratoga for the proposed line from Fort Steele south about 25 miles to Saratoga, and thence to the Colorado State line. The company has bought the right of way and grading of the Union Pacific for 15 miles from Fort Steele, made some 12 years ago. (June 16, p. 440; Wyoming Roads, May 12, p. 344.)

GENERAL RAILROAD NEWS.

BALTIMORE & OHIO.—Holders of interim certificates of Dec. 1, 1898, for preferred stock have been permitted to exchange the same for new preferred stock since June 19, at the office of Speyer & Co., New York. The company has made application to the New York Stock Exchange to list $69,799,000 prior lien 3½% bonds; $49,975,000 first mortgage 4% bonds; $35,000,000 preferred stock and $35,000,000 common stock voting certificates. These are the new issues under the reorganization. (June 2, p. 394.)

BALTIMORE & OHIO SOUTHWESTERN.—This property is advertised for foreclosure sale on July 10 at Cincinnati. It is to form a part of the B. & O. system. (June 2, p. 394.)

CENTRALIA & CHESTER.—A decree of sale of this road was filed in the United States Circuit Court at Springfield, Ill., on June 2, the property to be sold by the Master in Chancery, Stewart Brown, after 40 days advertising. The upset price is $550,000. The case has been appealed by the Farmers' Loan & Trust Co. to the U. S. Circuit Court of Appeals. (April 21, p. 291.)

CHICAGO, BURLINGTON & QUINCY.—Contracts have been let as follows for a portion of the extension of the Burlington & Missouri River from Alliance, Neb., south about 160 miles to Brush, Col.: Mike Ellmore, five miles; R. C. Cushing & Co., six miles; Andrew Sheridan, five miles; J. H. McShan & Co., 10 miles; Samuel Santell, 10 miles; J. Sharp, 10 miles.

An agreement has practically been completed between this company and the lessees of the Des Moines Union, for the use of that company's Union Depot at Des Moines.

COLORADO VALLEY.—Texas press reports state that this property was sold by order of the court on June 6, to representatives of the bondholders. It has been in the hands of J. D. Sloan, Receiver, since October. It is projected to run from Sweetwater, Tex., south 70 miles to San Antonio, and thence south to El Reno. It is graded for 30 miles from Sweetwater, and 7½ miles of track was laid about a year and a half ago. (Oct. 21, 1898, p. 770.)

DRUMMOND COUNTY.—The House of Commons at Ottawa, Ont., has passed the bill appropriatin, $1,600,000 to purchase the Drummond County line and to improve and lengthen it. This road was build about two years ago, and in connection with the Grand Trunk furnishes the Intercolonial with a line between Quebec and Montreal on the south side of the St. Lawrence. (Railroad Construction column, Oct. 1, 1897, p. 697.)

FLINT & PERE MARQUETTE.—The committee on the consolidation of this road with the Detroit, Grand Rapids & Western and the Chicago & West Michigan, announces that the majority of the preferred and common stock, of each of the companies, has been deposited under the plan of May 20, and that the plan is declared operative. The date of depositing other stock is limited to July 10. (June 16, p. 440.)

IOWA, MINNESOTA & NORTHWESTERN.—Grading on this line is being done by the Bethune-Craney Construction Co., and includes 74 miles of line from Parkersburg to Lake Mills. The completed line is to run from Belle Plaine, Ia., northwest via Parkersburg and Lake Mills to Blue Earth, Minn. It connects two sections of the Chicago & Northwestern. W. E. Brice of Mason City Ia., is President. (June 16, p. 439.)

LAUREL & NORTHWESTERN.—The Gulf & Ship Island has bought this property, which is now in operation between Laurel, Miss., and a point near the Leaf River, about 15 miles. An extension will be made west to connect with the main line of the G. & S. I.

LEAVENWORTH, TOPEKA & SOUTHWESTERN.—The suits begun about 18 months ago by owners of $247,000 bonds of this company to compel the Union Pacific to provide for the principal and interest of the bonds has been settled on the basis of the bondholders receiving a percentage of their claims. These bonds aggregate $1,380,000, of which one-half was guaranteed by the old U. P.

LEHIGH VALLEY.—Drexel & Co. of Philadelphia have exercised their option on the 75,000 shares of Lehigh Valley stock, given in connection with a loan made about two years ago. They take half the stock at $25 a share and the rest at $27.50. (March 31, p. 238.)

MANHATTAN (Elevated).—Judge Nash of the Supreme Court in New York City has filed a decision confirming the tax assessments of the City of New York against this company for more than $2,000,000. In declaring its regular dividend, the company includes the increased $18,000,000 stock recently issued for electrical equipment. (March 31, p. 238.)

MANITOBA & NORTHWESTERN.—The Clydesdale Bank of London has been instructed by the trustees of the first mortgage bondholders to make a final distribution of £3 10s. 6d. from the proceeds of the sale of land warrants and rights to lands. (Nov. 4, 1898, p. 806.)

MASSACHUSETTS CENTRAL.—A bill in equity was brought in the United States Circuit Court at Boston June 16 by the stockholders of this company, in the name of Benjamin W. Jones of New York, against the Boston & Maine to annul the lease of their road by the B. & M. on the ground of unjust discrimination against them.

PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS.—Speyer & Co., and Kuhn, Loeb & Co., New York, give notice to holders of first mortgage 7% bonds of the Pittsburgh, Cincinnati & St. Louis, maturing August 1, 1900, that these will be exchanged for P., C., C. & St. L. new consolidated bonds of 1949, at the price of 101, which will give the bondholders a cash payment of $24.10 on each bond. (June 9, p. 418.)

SAN FRANCISCO & NORTHERN PACIFIC.—The Mercantile Trust Co., New York, under the provisions of the mortgage deed, invites proposals on July 8 for the sale of the first mortgage bonds at a rate not to exceed 110, the entire amount set aside being $25,585. (Nov. 25, 1898, p. 854.)

SANTA ANA & NEWPORT.—The Southern Pacific has bought this property at the reported price of $400,000. The line runs from Santa Ana, Cal., to Newport, 12.1 miles, and is building an extension to Westminster. The sale also includes the wharf at Newport beach and shipping privileges. (Feb. 10, p. 111.)

SIOUX CITY, O'NEILL & WESTERN.—The Federal Court at Omaha, Neb., on June 15 confirmed the sale of this property to representatives of the reorganization committee made May 26 last. (June 2, p. 394.

UNION PACIFIC.—Arrangements are completed between this company and the Chicago & Northwestern, for the right to run U. P. trains over the tracks of the Chicago, St. Paul, Minneapolis & Omaha, from Norfolk, Neb., to Sioux City, Ia.

WASHINGTON & FRANKLIN.—A meeting of the stockholders of the Hagerstown & State Line will be held at Hagerstown, Md., June 26, to take action on consolidating this property with the Washington & Franklin under the title of the latter road. Both companies were chartered last year to build the cut-off of the Western Maryland.

TRAFFIC.

Traffic Notes.

The Northern Pacific announces that on its lines in Manitoba passenger fares will be reduced from 4 cents a mile to 3 cents.

President J. J. Hill, of the Great Northern, announces to the farmers of North Dakota that he will give them free excursions, in parties of 50 or more, from each county to Fargo to inspect the State agricultural college and experiment station.

The railroad commissioners of California have issued a new tariff of rates for the transportation of grain, and it is announced in the newspapers that this tariff effects a reduction of 10 per cent. from the rates now in force. But some of the newspapers assert that while it may be possible to figure out an average reduction of 10 per cent., the rates on the lines where the most grain is carried are not much reduced; and it is averred that this irregular reduction and the deceptive way of stating the case have been adopted to please the Southern Pacific Company.

The railroad commissioners of Texas have ordered the railroads to insert a clause in bills of lading to the effect that the rates named in the bill are subject to correction if they do not prove to be right according to the rules of the Commission. This was made necessary by the passage of a law recently by the Legislature requiring railroads to stand by their bills of lading, right or wrong; which was clearly in conflict with the earlier law requiring all rates to conform to the tariffs prescribed by the Commission.

Interstate Commerce Hearing at Chicago.

The inquiry of the Interstate Commerce Commission into export grain rates, which was begun in New York last month, was resumed in Chicago June 13 and 14. One of the first witnesses was Charles Counselman, an exporter of grain on a large scale. Mr. Counselman said that the very low rates made by the railroads for grain going to Europe were a necessity if the trade was to be kept moving with reasonable regularity. When the European demand is slack, only very low freight rates will enable American dealers to make foreign sales. If freight rates were rigid every slackening of the foreign demand would greatly demoralize prices in this country. The competition in Europe of grain from other countries is a constant and vital factor that we cannot disregard.

A number of millers who followed Mr. Counselman disputed his evidence and made a strong plea for the reduction of rates on exported flour, so that the grain could be ground here instead of being ground in European mills.

Mr. A. C. Bird (C., M. & St. P.) testified concerning the difference between export and domestic rates. He would be glad to get as much for export grain as for domestic, if he could, but with the severe competition in export business believed it impossible to make equal rates.

Interstate Commerce Hearing at St. Louis.

The Interstate Commerce Commission sat in St. Louis on June 15 and 16, to hear additional evidence in its inquiry concerning freight rates on grain and flour to the seaboard. Mr. Drew (M. K. & T.), testified that the rate on export grain to Galveston from Kansas City and vicinity was 10 cents per 100 lbs. Only at certain seasons of the year could grain be exported from Galveston without danger of heating. Mr. Drew said that 98 per cent. of the grain handled at Galveston was raised in the State of Texas; hence the quantity exported by that route which might be competed for by the Eastern roads, was very small. The Kansas grain which now goes to Galveston, formerly went through New Orleans.

Mr. Hanley (K. C. P. & G.) said that for nine months his road had run steamers to Liverpool and Hamburg. The through rate (no time stated) was 28 cents. Grain taken by his road to Port Arthur was delivered to steamers by lighters; that taken to New Orleans was delivered at the Texas & Pacific elevator. It was necessary to make lower rates on export grain than on that for domestic points on account of the very sharp competition for the export business. Mr. Knott (L. & N.) said that his road took export grain to only one port, Pensacola. Vessels sailing from that place only want grain enough to fill up when their ordinary shipments do not furnish a full load. At present the Louisville & Nashville can get no grain for Pensacola, even when offering so low a rate as 6.5 cents.

Mr. McLaughlin (B. & O. S. W.) said that his road had carried no grain since Jan. 1 because the rates had become unremunerative. His shippers said they could do better to send through Chicago. Mr. McLaughlin denied that the falling off in shipments through St. Louis was due to smaller crops in the territory tributary to that city.

Judge Reagan, Chairman of the State Railroad Commission of Texas, presented his views on the general subject of export rates. He though that the country should be divided into zones and in each zone the railroads should hold a convention and establish rates, which then could be rigidly maintained by law. He would amend the Interstate Commerce Law to permit this.

Mr. Middleton (St. L. & S. F.) said that the local millers along his line suffered because wheat was taken to the seaboard so much cheaper than flour.

Mr. Vanlandingham, Commissioner of the St. Louis Traffic Bureau, said that the recent manipulation of export rates had produced great discrimination against St. Louis. From the West the rate to Chicago ought to be 5 cents more than to St. Louis, but as a matter of fact this difference had been wiped out. The lines from Kansas to Galveston had also made low rates injurious to St. Louis. Lines to the Gulf took grain there in spite of hot weather, millions of bushels having been sent through in the hottest months in the year without damage. Boats on the Mississippi River cannot compete with the railroads in carrying grain to New Orleans and little goes by river except that of firms which own boats. In 1897 St. Louis handled 97 million bushels of corn, Chicago 108 millions; St. Louis would have had more but for the favorable freight rates given to Chicago. Witness could see no reason for charging higher for grain products than for grain. Hogs and hog products go at the same rate, beef and beef products at the same, pig lead and reductions therefrom at the same.

Chicago Traffic Matters.

Chicago, June 21, 1899.

General passenger agents of the lines of the Western Passenger Association are balloting daily on a successor for Chairman Caldwell, who has resigned to accept the general traffic managership of the Delaware, Lackawanna & Western road. On the last ballot James Charlton, General Passenger Agent of the Chicago & Alton, received the largest vote. Other candidates who are in the race are George J. Charlton, Assistant General Passenger Agent Chicago & Alton; A. B. Smith, Assistant General Passenger Agent Burlington & Missouri River; A. L. Craig, Assistant General Passenger Agent Northern Pacific; T. W. Lee, assistant to Mr. Caldwell, and Commissioners Wellington and Parker, of the Western Trunk Line Committee. The executive officers of the roads in this association have decided that the salary of the Chairman of the Western Passenger Association must in future not exceed $7,500.

Executive officers of the lines members of the Western Trunk Line Freight Committee have at last decided to dispense with the services of three of the four commissioners of that organization. H. H. Courtright will be retained, with the title of Secretary, at a salary of $6,000 a year, and Commissioners Parker, Wellington and Shute will go out. The new arrangement will become effective July 1.

The National Association of Merchants and Travelers has induced the general passenger agents of the roads of the Central Passenger Association to put in reduced rates during the fall to enable country merchants to come to Chicago for their fall buying. The railroads had shown a strong disposition not to repeat this experiment, last year's experience not being very satisfactory; but they finally yielded.

During the past year officers of the Central Passenger Association lines have been greatly annoyed by the loose methods pursued by express companies, or their representatives, in applying for and using free transportation. The officers of these roads have now laid down a set of stricter rules which the express companies must follow in applying for and using the transportation that is allowed them by the railroads.

Executive officers of the Western roads have taken the question of ticket commissions in hand and have decided that after July 1 the payment of the same must be more restricted.